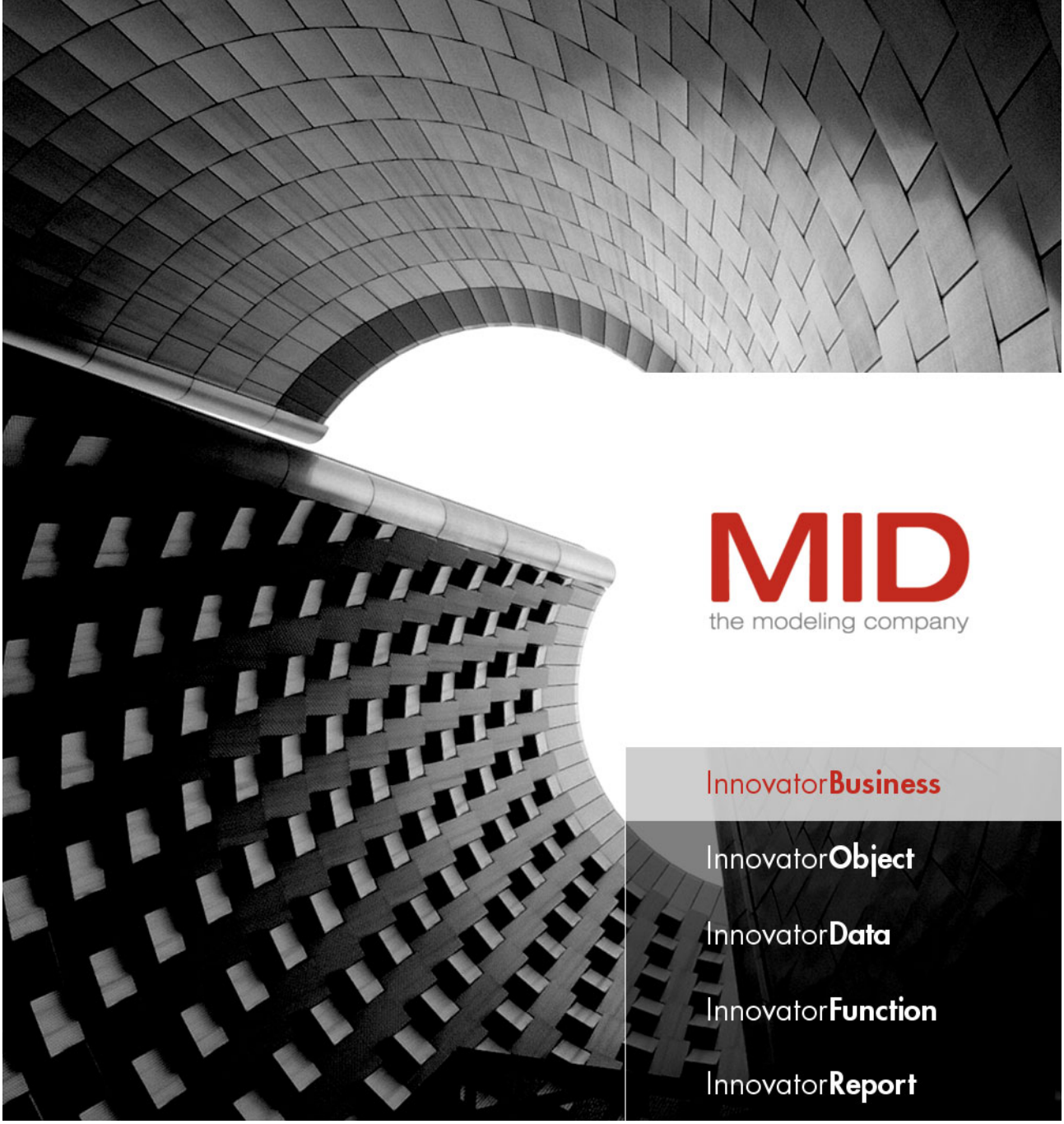

Innovator 11

Manual classiX - D Business

Innovator Business: Business Process Modeling with UML

www.mid.de

Manual classiX - D Business–Innovator 11 (version 11.1)–Edition April 2010

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Part D Innovator Business: Business Process Modeling with UML

Globalization and the requirements of international markets force organizations and companies in almost all industries to subject their business processes, services and communication channels to stringent and systematic analyses. The results of such analyses are intended to uncover weak spots and demonstrate optimization potential. This enables improved customer orientation, as well as more efficient and cost-effective processes.

UML as a Tool for Business Process Modeling

A great number of studies, essays and methodologies have researched approaches to perform such a re-organization in the most comprehensive, effective and transparent way.

The Unified Modeling Language (UML)–a description language for project models from the area of object-oriented software engineering–provides a systematic approach as well as notation and representation features that lend themselves to solving a wide variety of requirements involved in business process analysis and optimization.

The Innovator Business edition supports UML 1.4 along all stages, from strategic planning, operative requirements and company organization all the way to the integration of an IT system.

Contents of This Section of the Manual

Business process modeling aims to record business processes and their implementation within a company.

- If you do not have sufficient experience with **business process modeling** requirements in general or with **UML** in particular, you will find it helpful to read chapter D-1, "Innovator Business–Terms & Concepts", page D-3, which contains the most important information as an introduction into this topic.
- **General aims, identifying services from outside**: you can use a **use case diagram** to display the larger business cases which should be examined and who benefits from these or which relevant people are involved in the implementation (see chapter D-4.1, "Realizing Requirements with the Use Case Diagram", page D-80).

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- **Describing the company organization flow**: the central diagram in the Innovator Business edition is the **activity diagram** (see chapter D-5, "Specifying Activities in the Process Model (Activity Diagram)", page D-115). You can identify tasks and place them in the desired order here. If required, enter the objects concerned, as well as the necessary/generated resources or documents.

  The **activity definition diagram** is a type of activity diagram: you can display precisely one activity, including all of its interfaces to objects or other activities here (see chapter D-5.4, "Creating Activity Definition Diagrams for an Activity", page D-147).
- **Describing the company's structural organization**: you can display which organizational units, devices and other objects have which permanent relationships to one another (see chapter D-3, "Covering Resources, Setting Structures (Object Diagram)", page D-63).
- **Describing communication paths and structures**: the **sequence** and **collaboration diagram** diagram types are best suited for this (see chapter D-4.2, "Displaying Time Flow of Communication (Sequence Diagram)", page D-90, or chapter D-4.3, "Displaying Structural Organization of Objects (Collaboration Diagram)", page D-104).
- **Running through the influence of various conditions**: you can store additional information in the activity diagram; this can identify a flow in the additional performance **simulation**, such as probabilities, times, costs etc. and run through various variants (see chapter D-6, "Analyzing and Simulating Processes", page D-149).
- **Creating model documentation**: you can give your model's elements specifications and create model documentation in part or a complete model documentation from them (see Part C, "Creating Model Documentation", page C-1).
- **Modifying model configuration**: when working with Innovator Business edition, you always use elements which are provided in the so-called **configuration model**. You will normally use the configuration model, which is included within the scope of delivery. However, if your model has special requirements you can modify the configuration model used as a basis or even create a new one in extreme cases. **You need to have extensive knowledge about the concepts and construction of Innovator to be able to do this** (see chapter D-7, "Setting the Use of Elements in the Configuration Model", page D-181).

D-1 Innovator Business–Terms & Concepts

The following should give you an overview of the basic functions and concepts of the Innovator Business edition and the terminology associated with it. This means that the main focus is on **what** (the Innovator Business edition edition can do), **not how** (precisely it can do it). You can also find the suitable reference points to the respective chapter of your user manual.

This introduction should not be and is not a comprehensive representation of either the **business process modeling** methods or the **modeling language UML** ("Unified Modeling Language").

Target Group

The first part is primarily designed for Innovator Business edition users who already have first-hand experience with business process modeling and merely wish to find out information about how UML and Innovator can help with this task.

The next few pages will give you an extremely compact introduction (corresponding to the available framework) into business process modeling using UML (as well as the UML language itself). MID GmbH provides methods and handling training[1] covering the complete theory and practice of the contents discussed there. The existing user manual cannot be used as an alternative to this, as it is primarily seen as a reference book for handling.

The introduction consists of the following:

What You, as the User, Should Read

The basic concept of Innovator Business is the specification of business processes using UML (which has now become the standard for object-oriented software development). **chapter D-1.1** outlines the advantages of this approach.

chapter D-1.2 is aimed at readers who have no previous experience with UML and introduces the most important terms connected with object-oriented modeling language in a simple manner. The aim is to enable all members involved in a project to have the same level of terminology. As you will undoubtedly discover, the advantages gained throughout the course of the project are notably larger than the training costs for UML beginners. If you are already familiar with the basic UML terminology, then you can skip this section.

1. You can find information about this under www.mid.de/MID-Akademie

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chapter D-1.3 focuses on the range of diagram types which are available in Innovator Business for creating diverse views of the company to be modeled. Diagrams which are created in the "Business Processes Banking" example in the `demo_us.ir` demo repository will mainly be used as illustration; this is included in the scope of delivery of Innovator 11.

chapter D-1.4 contains a short introduction into the approaches used in business process modeling with UML examples.

What you, as the Developer or Administrator, Should Read

The following chapter is aimed at advanced users active in software development or as administrators.

chapter D-1.5 addresses the various options for evaluating the results of your business process modeling (analysis and simulation) or transferring them to other Innovator editions (e.g. for generating analysis and design models for software development, which are directly based on business process elements).

chapter D-1.6 contains the basics about the configuration concept of Innovator Business edition. As is the case throughout Innovator, you have extensive options for adapting the edition to meet your requirements, from the appearance of the user interface right through to conceptional settings, such as diagram types defined by yourself in the configuration model. This chapter informs you of how to carry out your own configurations and why these might be useful.

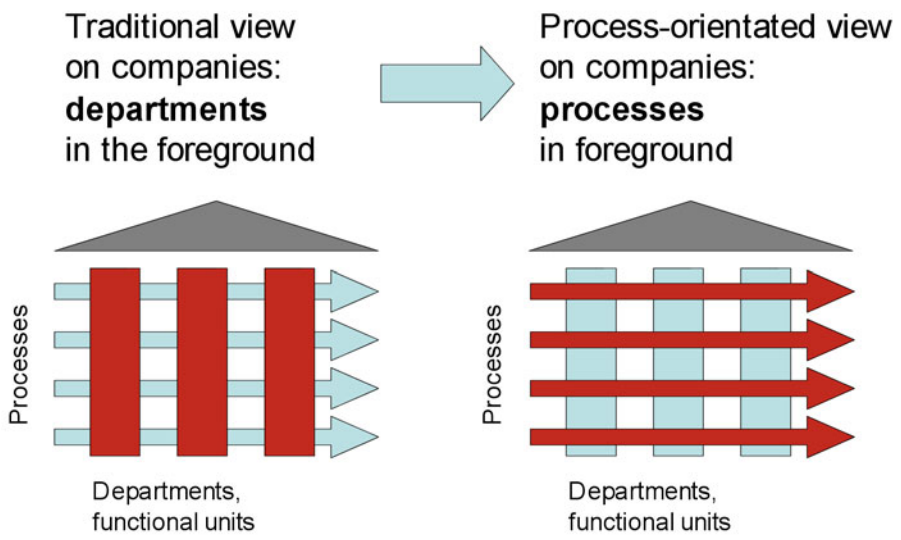
chapter D-1.7 provides an overview of Innovator Business extensions compared with UML Standard 1.4.

chapter D-1.8 contains a glossary which briefly explains recurring terms from the Innovator Business edition and other Innovator editions; it is designed as a quick reference.

D-1.1 UML in Business Process Modeling

Those **actions in a company which** "when put together make up a value for the customers e.g. the –development of a new product" are identified as business processes[1]. The approach behind this is to not only view organization structures (such as departments or groups) and subtasks within these (such as tire fitting or paint work), but also to detect and examine structured and continuous processes.

1. Hammer, Michael; Champy, James: "Business Reengineering". Campus Publishing House, Frankfurt/Main-New York, 1994



Two Views of One Company

Specifying Processes

If you want to do this, then you require a tool with which you can clearly specify and edit these kinds of processes. Since Version 6.1 of Innovator (1998), MID GmbH has been using the popular and widely-used UML in software development for modeling and business processes.

Where Does UML Come From?

Nowadays, UML is believed to be the standard in object-oriented software engineering. It was developed by Grady Booch, James Rumbaugh and Ivar Jacobson in the early 90's and standardized by the Object Management Group (OMG) in 1997, which also coordinates their further development in the future. You can find information about the UML specifications on the internet under http://www.omg.org.

Advantages

Using UML in business process modeling provides a wide variety of advantages:

- UML is perfect for displaying **various views** (e.g. "perspectives"; see page D-17) of business processes, as it provides types of diagrams which can create various aspects of the business procedures in question for all these views and, therefore, highlight or omit them. Various aspects of the generated company flows considered can be omitted. In particular, the initially outlined process-orientated and flow-orientated approach can be well implemented into a company.
- Nowadays, UML is a recognized **standard** which is well-known by software developers working in the field of object orientation, so that it is not necessary for them to learn a new modeling language to understand the business process modeling results.

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- This essentially means that **all** members involved in a project speak the same language: The **graphic** models made using UML can similarly be understood by system analysts, specialists, management and development departments, thereby reducing errors made during process modeling. Early identification of errors is a central factor for software project success.
- This means that **software model transfer** does not have any technical disruptions and elements from the company model can be transferred as specifications in the software model which is to be developed.
- Modeling using UML enables support and **further processing** of such models using the Innovator tool, i.e. the modeled process can be analyzed, simulated and, if necessary, improved. The Innovator environment also offers the option of company to software model transfer and the production and documentation of software products using automation for reducing, simplifying and monitoring.

D-1.2 Introduction into UML for Business Process Modelers

UML uses a certain limited basic vocabulary, which will be used over the following pages without reference to the IT world, as it is your first encounter with UML. Reading this will give you more of an idea of what is meant by terms such as activity, object, class, relationship and state. You will also get your first taster of how UML works with diagrams and how it should be read.

D-1.2.1 Business Processes

Activity Diagrams

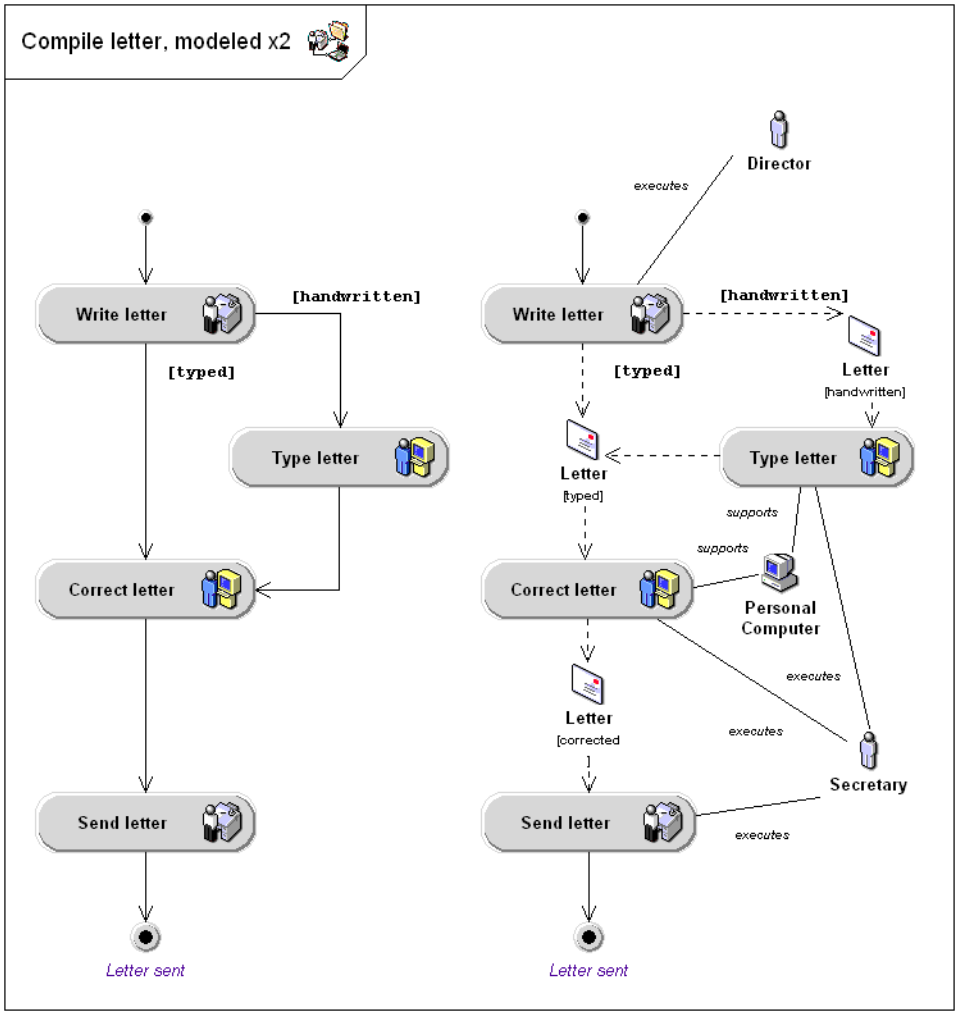
The **activity diagram** is the most important tool for modeling and visualizing business processes. It specifies time flows of **activities** and the **objects** concerned. On the one hand, objects can be active objects which carry out an activity or take part in it. On the other hand, objects can be passive objects which can be worked on within the framework of the activities. Examples of these are documents or software components.

Activity

Activities are individual operations in a process which require a certain amount of time and should not be interrupted. The modeled business process ultimately consists of a sequence of activities, which create, alter or consume objects. These objects can concern work equipment or resources, as well as products or so-called **actors**. These are people or other systems which are involved in the process.

Example

In the following figure, the example used to illustrate this is the compilation of a letter, which is shown twice as an activity diagram. The left-hand diagram only shows the least amount of information about which activities occur in what order. The right-hand diagram models the same process, but contains additional information, such as e.g. the objects processed and created in the process and the places these processes are carried out. (Diagram elements you are not familiar with are explained after the figure.) An activity diagram does not need to be extensive, but should rather contain what information you want to model in certain circumstances.



Two Activity Diagrams of the Same Process

Associations

Associations connect active objects with activities. In an activity diagram, an association models a cooperation of an object to the activity being executed. In the example, the positions of `manager` and `secretary`, as well as `office computer` are active objects.

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Flows

In the example, alongside the associations there are also arrows between activities. These are called **transitions** and represent the fact that after the previous activity is completed, the next one in the order is then immediately carried out. These transitions specify the actual process flow and, therefore, form the basis of so-called **control flows**.

You can also find transitions to and from objects which, in contrast to the ones between activities, are shown as a dotted arrow. These specify the creation or processing of objects (here: products) and are, therefore, called **flows**.

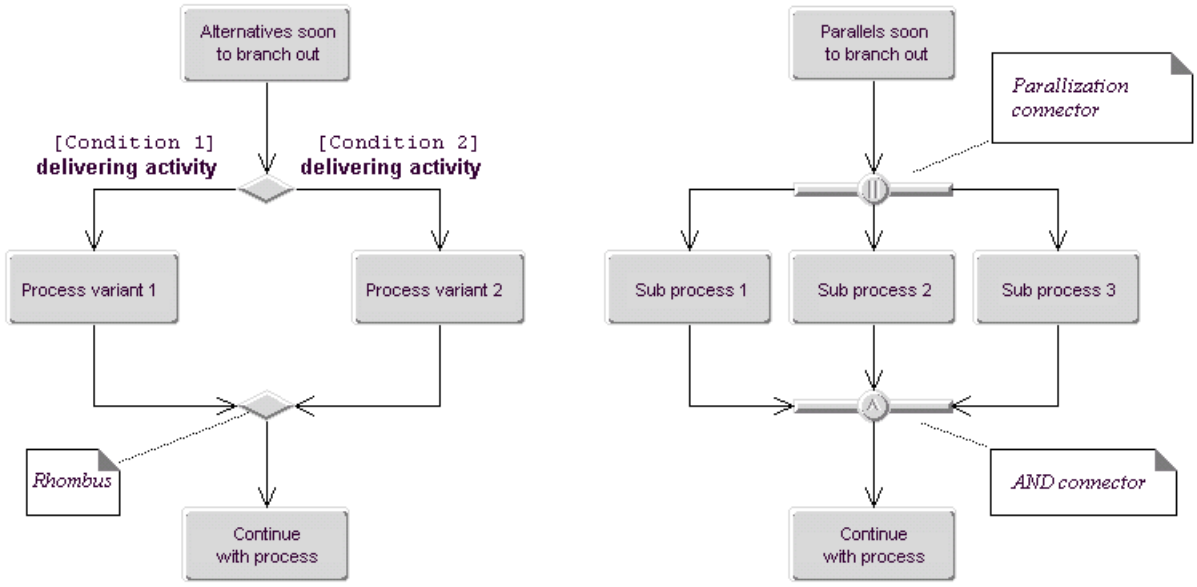
If you look at the transfer between the `correct letter` and `send letter` activities in the example you can see that the flows can also be used as control flows. This avoids the use of two parallel flows, which would mean the additional creation and processing of an object.

Branches

Flows in an activity diagram can **branch out** and, in doing so, specify various process flows, depending on whether certain conditions exist or not. **Conditions** are usually results of activities in the diagram and are attached to transitions to show that this transition will only be followed if the condition attached to it is fulfilled. In the example, this model element is used for the `write letter` activity where, depending on whether the letter was hand-written or typed (the results of the `write letter` activity), various transitions are carried out in the process. This means that more than one flow variant can be displayed in the same diagram.

Connectors

Connectors are often used to visualize branches of flows. They are graphical elements which determine the start and end of a branch. For branches with one option, this is the **rhombus**. (In the `compile letter` example, the alternative illustration shows the branching transitions run directly out of the activity rather than from a rhombus.) However, if you want to trace and process all branching flows at the same time parallel to one another, then **fork connectors** are available. Its counterpart at the end of a fork, the **AND or OR connector** determines whether all or only one of the parallel flows should be processed for further use.



Junction and Parallel Branch Connectors

States

When processing an object, the activities concerned normally change the **state** of an object. In an activity diagram, the state of an object is shown in square brackets; in the example e.g. where a letter runs through the `[typed]` and `[corrected]` states. An object remains a certain state until this is altered by an activity in the process, which can be initiated by an **event**. Such a change in state is also called a **transition**.

Other Elements

Transitions can be provided with **actions** as well as conditions. These should be carried out if the transition is run. For example, sending a message.

Messages show the communication between the objects in a process. (These are particularly noticeable in sequence diagrams.) In the Innovator Business edition, the term for a message is further conceptualized: Messages can generally be interpreted as triggers for events and modeled as **send and receive events**.

Refining Activities

You can specify a business process in as much detail as you wish with the activity diagram elements that have been introduced. An individual activity in such a diagram can be specified in more detail in another activity diagram (a **refinement diagram**). This should be done if the diagram looks as if it is becoming too complex.

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D-1.2.2 Process-Independent Structures

In the previous section, you have learnt how to specify a process and the dynamic aspects of your model. Static relationships, such as structural organization or IT infrastructure, can also be relevant to business modeling. These statistical relationships are specified using **relationships between objects** and can be optionally visualized in **object diagrams**. They clearly differentiate between the associations between activities and objects in activity diagrams. They model the cooperation of an object to the activity to be carried out in a certain process context.

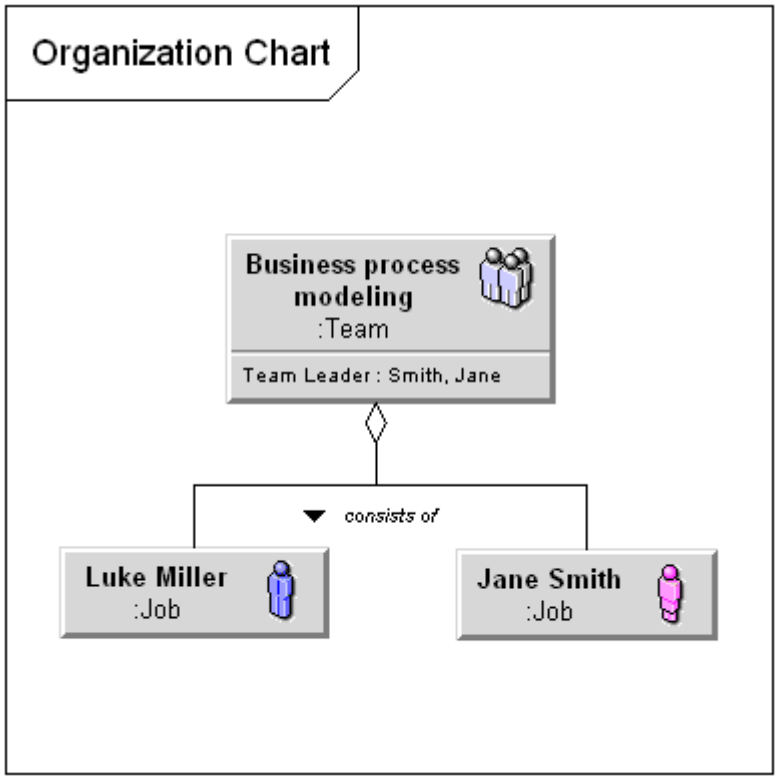
Objects

An **object** is the specification of an object from the real world e.g. an object (chair, factory), a person (customer, employee) or an abstract term (account, advice).

Object diagrams are flexible tools which can be configured by the administrator for various purposes. You can illustrate the most varied (but always static) conditions in them, such as:

- Structures of business objects
- Targets for company processes
- Hierarchies and other organization structures

Relationships between objects model a connection between objects which are independent from the flow of the modeled processes.



Example of Relationships between Objects

The example shows the hierarchical relationship `made up of`. The read direction path illustrates how the name should be read and that the group is made up of employees. The rhombus attached to the `business process modeling` group shows that the group is the top-most element in the aggregation.

Objects can also be referred to as **instances** of a class.

Classes (with their attributes and relationships) are part of the **configuration model**.

D-1.2.3 Use Cases

While the term business process refers to an internal flow, the use case flow requires priority in the company-external perspective.

Use Case Diagrams

Instead of refining processes as much as required using activity diagrams, it can also be helpful to create an overview of all existing business processes. You can do this using **use case diagrams**, which illustrate which actors (in particular, customers) require which business processes or which business processes they are involved in. If a relationship of this kind is expressed, then an association is created between a use case and an actor.

Association between Actor and Use Case

A **use case** is a closed sequence of interactions between the company which is modeled and one or more actions. An actor in a use case diagram can, therefore, play the role of an object external to the company e.g. a person with the role of `customer` or a company with the role of `supplier`. One of the actors activates the use case with an action and is therefore referred to as the **initiator**. The characteristic of a use case diagram is mainly the benefit of the initiator (or other actors).

Use case diagrams are frequently used at the beginning of business process modeling, as due to their **external view** of the company (in particular, the customer's view) they are particularly suitable for finding business processes which can be individually specified using activity diagrams.

Other UML Diagrams

All Innovator Business diagram types are shown in examples in Kapitel D-1.3.

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D-1.2.4 Classes of Similar Object and Activities

We have not yet discussed one of the main terms used in UML, "class". This is because it is not one of the main focuses of a business process modeler.

Classes

In general terms, a class of objects is a quantity of similar objects. The way in which this similarity is determined is important. Attributes and relationships are the distinctive characteristics for business process modeling in Innovator Business. Therefore, all objects which have the **same attributes** and assume the **same relationships** belong to a joint **class**. When referring to their classes, objects are also referred to as **instances** of their class. Each object in a business process model is an instance of precisely one class.

In Innovator Business, the concept of a class is not only applied on objects, but also on activities. Due to the fact that activities can assume associations and have attributes in a process model (such as, e.g. the estimated processing time), the next obvious consequence is to define the possible relationships and attributes of activities as well as objects on the level of their respective class. The class model which results from this (which determines the amount of all classes of objects and activities, as well as the permissible relationships to each other) is part of the **configuration model** (see chapter D-8.1, "What You Should Know about Configuration", page D-222).

D-1.2.5 Model Levels in Object and Activity Diagrams

When talking about objects and classes of objects it quickly becomes apparent that the objects being modeled are always concrete objects i.e. in the business world, this refers to actual computers and people available in the company. The next example should show, however, that this is not normally the case when the activity of adapting a process model specifies a concrete project.

"Create Project-Specific V-Model" Activity

The example shows the `create project-specific V-Model` activity, which delivers a `contains generic V-Modell` as an incoming product and after successful implementation, a `project-specific V-Model`. The activity is carried out by the `project manager`, although the `supplier` is also involved. In the example, the configuration classes of

the individual elements are displayed, i.e. `document`, `process step`, `customer` and `role`. The activity is also an instance of the `process step` class and the project manager is an instance of the `role` class.

How does the transfer look in the real world? The activity diagram generally specifies the process. With regard to the example, precisely one `create project-specific V-Modell` activity and precisely one `project-specific V-Model` is given for every process carried out. This can also be the same in every project, as is the case with the `supplier`. In many companies, the role of the `project manager` is probably only administrated by one person.

This example should show that the concept class and instance or object which were described before do not limit you in modeling. They correspond to the splitting of the Innovator model into two: on the one hand, the configuration model with the modeling terms can be modeled using classes, their relationships and their attributes. On the other hand, the company model (in which you use the configured terms), to model your processes and structures with instances of configured classes.

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D-1.3 Types of Diagram in Innovator Business

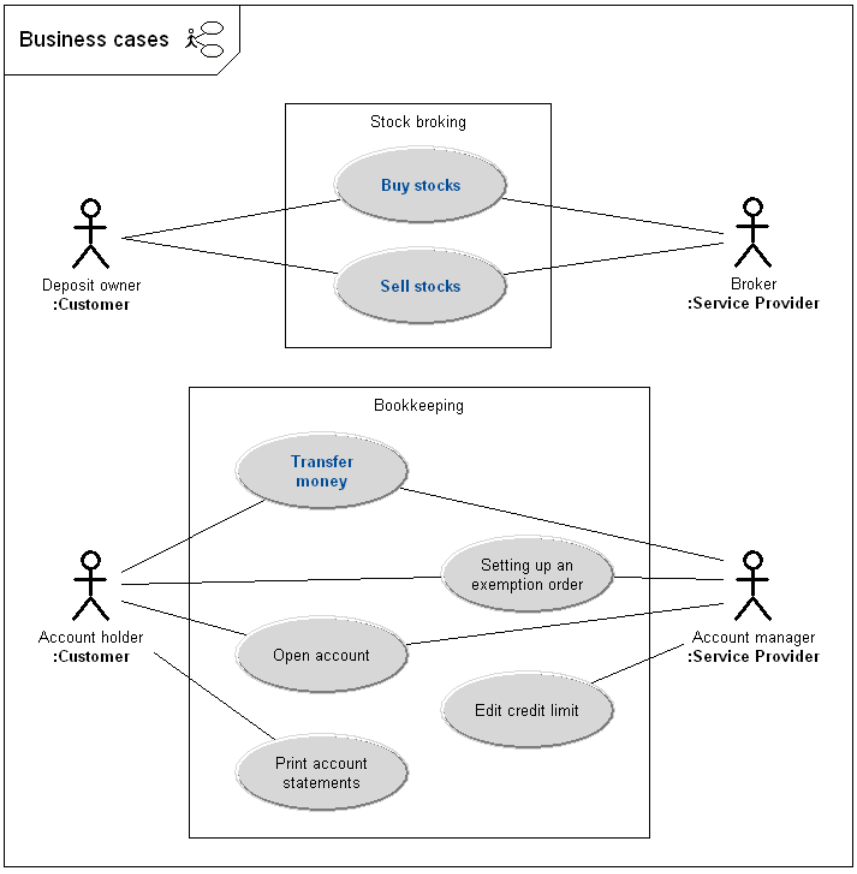
In accordance with UML standard, Innovator Business edition contains the following diagrams for modeling:

- Use Case Diagram
- Activity Diagram
- Activity Definition Diagram
- Sequence Diagrams
- Collaboration Diagram
- Object Diagram
- Class, State and Package Diagrams

Please read chapter D-1.7, "Innovator Business edition Edition Deviations from UML 1.4", page D-31 for possible variations with the UML standard.

Use Case Diagram

A use case diagram shows actors from outside the modeled company or part of the company and their relationship to possible use cases. This way, relationships to other departments or companies are also covered: these are also visualized as actors. Frames ("system limits") enable the common bond between use cases to be visualized.

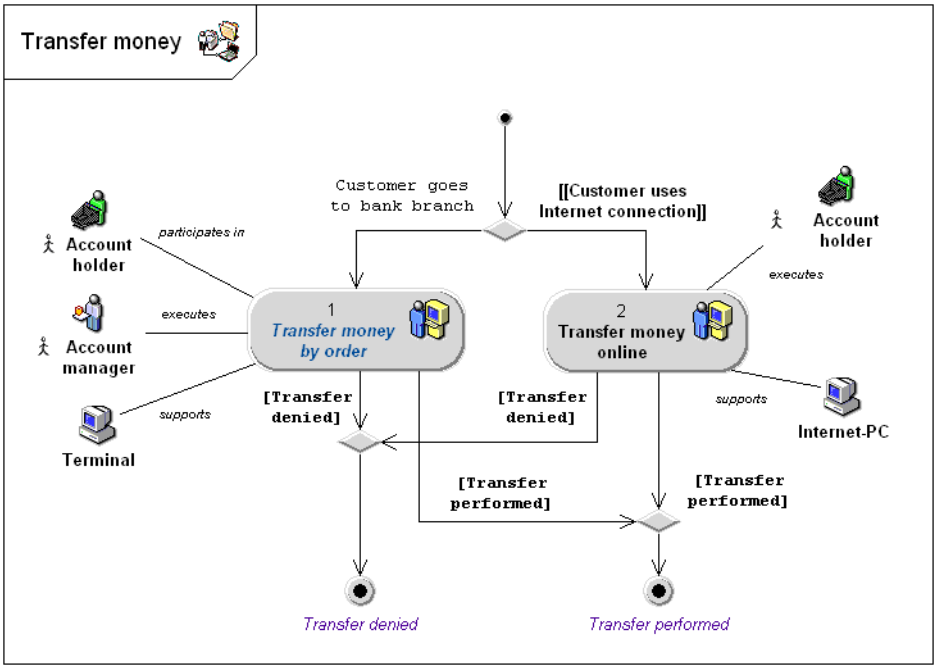


Example of a Use Case Diagram

Activity Diagram

An activity diagram shows e.g. a concrete use case which has activities, events and state transitions running out of it. Activity diagrams show business processes or the flow of scenarios and can be described ("refined") in more detail in other activity diagrams if required.

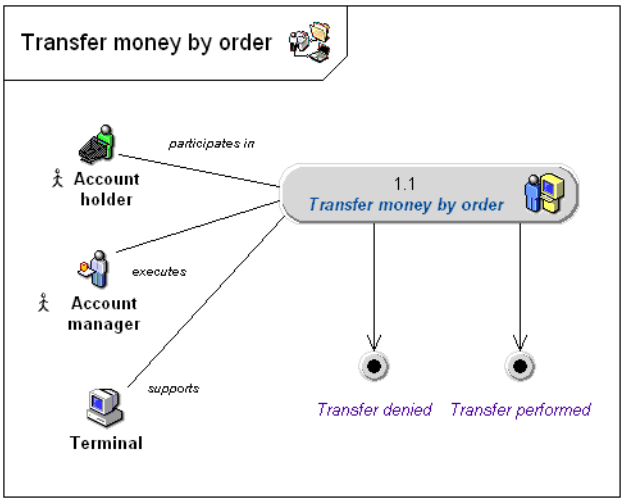
In addition, performance indicators, such as incidence rates, which can be evaluated or processing times/costs can be integrated. In this way, activity diagrams are not merely the central tool for modeling dynamic processes, but are also the basis for their analytical or simulative evaluation.



Example of an Activity Diagram

Activity Definition Diagram

An activity definition diagram shows the entire context of an individual activity. Use of an activity definition diagram is not obligatory, but can e.g. be useful for specification of frequently used base activities. If there is an activity definition diagram, this will also be used to check for consistency and correctness of an activity diagram.



Example of an Activity Definition Diagram

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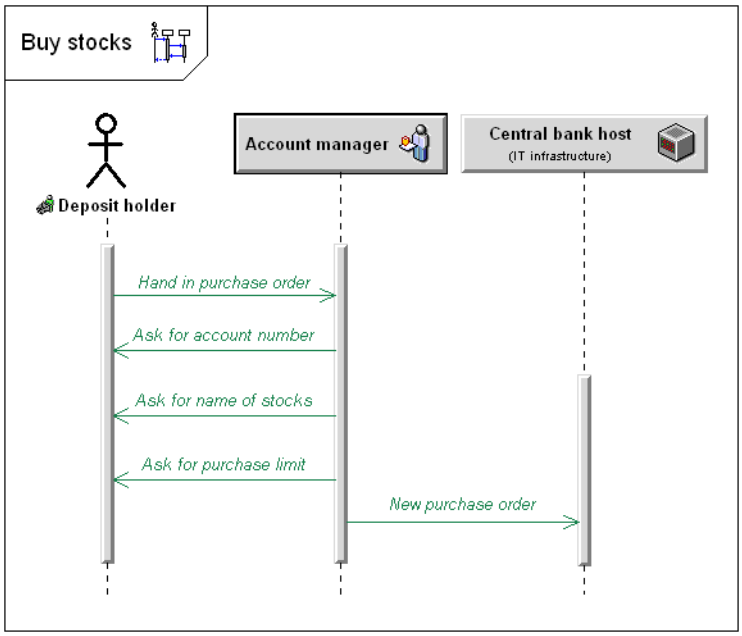
Sequence Diagrams

A sequence diagram shows the interchange of messages between objects and, in particular, its time flows. Sequence diagrams are primarily used for the external view of the company and the specific description of its interfaces; you can use them both theoretically and to illustrate the internal view. (You can find more information about views in chapter D-1.4, "Modeling Business Processes Using UML and Innovator Business", page D-17.)

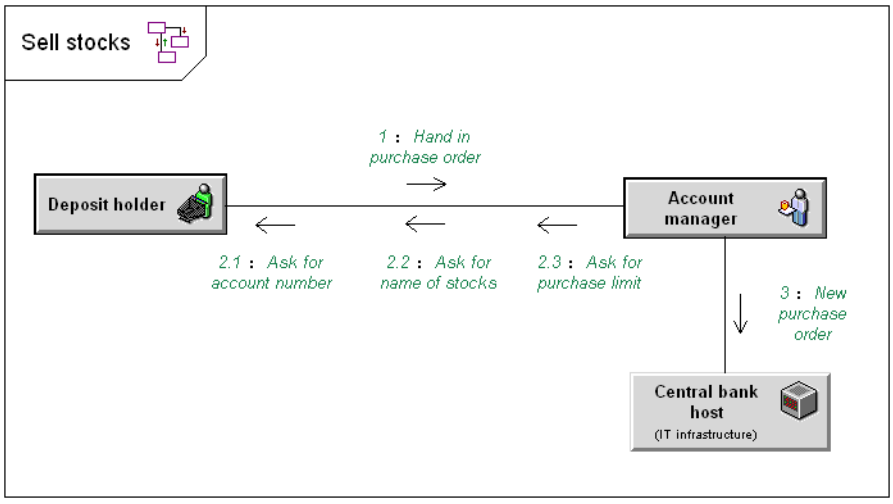


Example of a Sequence Diagram

Collaboration Diagram

A collaboration diagram specifies which relationships exist between objects. Messages can be attached to these relationships; their order can be expressed using hierarchical numbering.

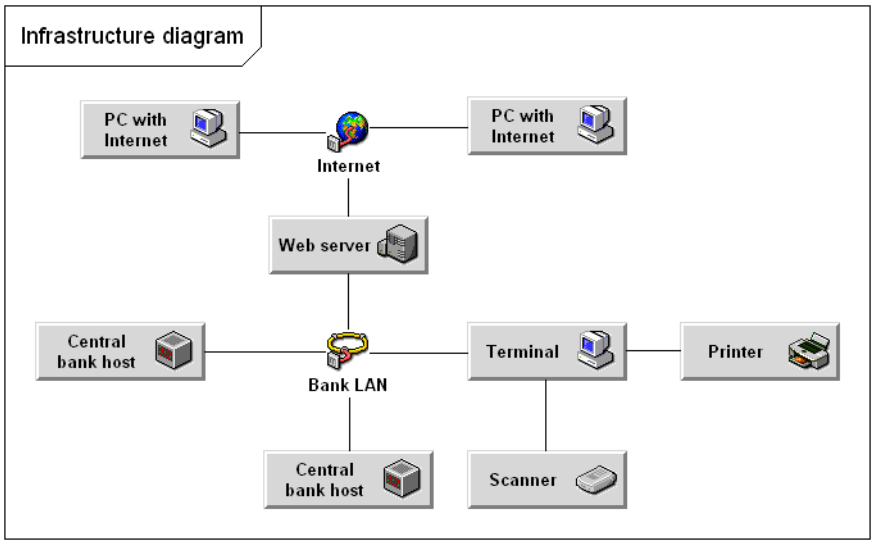
You use the same element types in a collaboration diagram as in a sequence diagram. The only difference between both types of diagram is the way in which the elements are illustrated.


Sell stocks
1 : Hand in purchase order
Deposit holder
Account manager
2.1 : Ask for account number
2.2 : Ask for name of stocks
2.3 : Ask for purchase limit
3 : New purchase order
Central bank host
(IT infrastructure)

Example of a Collaboration Diagram

Object Diagram

An object diagram shows a set of objects and their relationships. The modeling of structures in companies which are independent of company processes are therefore predestined. Examples of this are the organization of the company or the company's IT infrastructure.



Example of an Object Diagram

Class, State and Package Diagrams

In the Innovator Business edition, these are primarily used for configuration purposes and will, therefore, not be explained in more detail.

More Information

- chapter D-7.5, "Setting Terminology, Properties and Relationships of Elements (Class Diagrams)", page D-195
- chapter D-7.6, "Setting Possible States for the Element (State Diagram)", page D-209
- chapter A-3.2, "Modeling Dependencies Between Packages in Package Diagrams", page A-45

D-1.4 Modeling Business Processes Using UML and Innovator Business

Business process modeling can result in both the modeling of the current status of a company and serve as a way of formulating targets.

Why Model Business Processes?

They are carried out for various reasons:

- for gathering actual flowing business processes, e.g. for documentation or standardization
- for determining areas for improvement in flows or uses of resources
- for defining specifications for software systems (requirement analysis)

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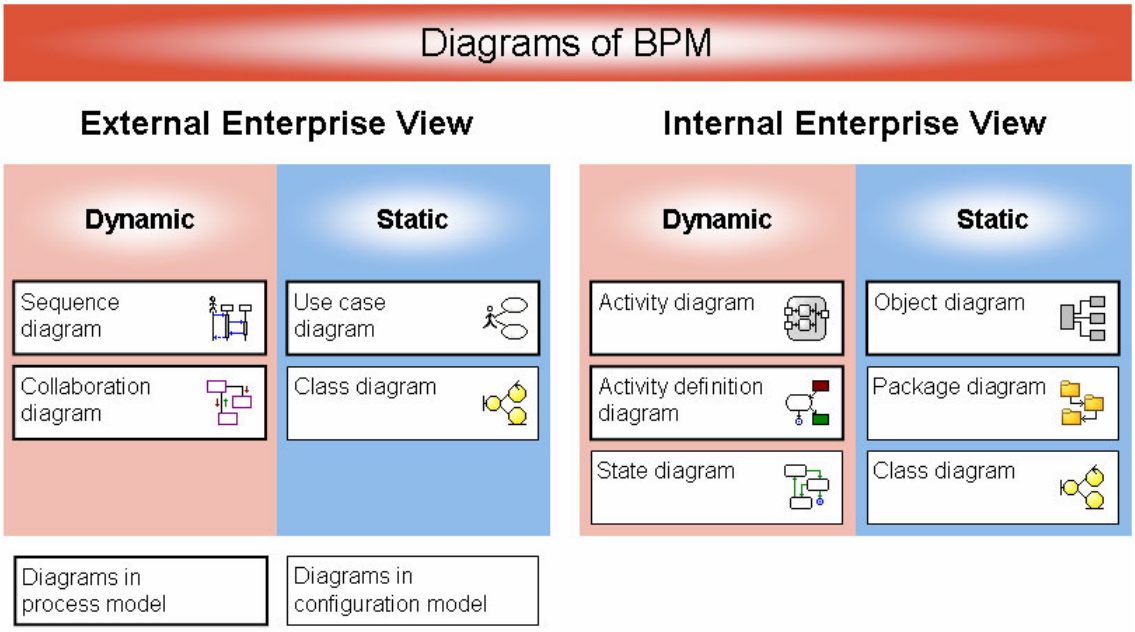
What is the best way to proceed when modeling a company or part of a company? The following examples can in no way replace training in methods, but are meant as recommendations and the first steps towards classification of terms and types of diagrams. But before this, a short note on the term "model":

The Term "Model"

The purpose of a model is to better understand the object considered. This inevitably means that the modeling of very complex objects is limited to certain partial aspects according to what is required. Another way to say this is: "Modeling always means **emphasize** and **omit**."[1]. This results in different **Views** of the object considered; it is the sum total of all views reflects this in its entirety. In the end, the model may therefore consist of a large number of diagrams that show different perspectives.

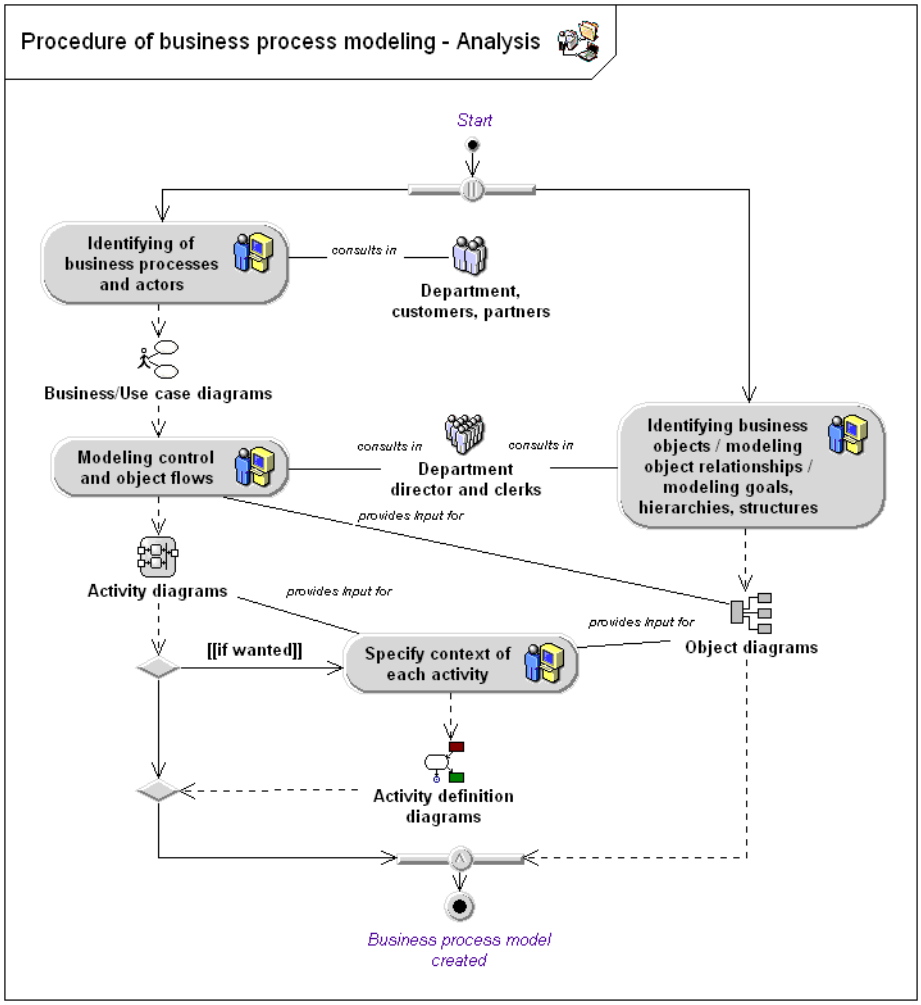
This is reflected in business process modeling using UML by the various diagram types which were introduced in chapter D-1.3, "Types of Diagram in Innovator Business". The following chapter will describe their place in the modeling process:



Types of Diagrams in Business Process Modeling

It is not obligatory to keep the order of the following steps. During the modeling process you frequently need to go back to a sub model which has already been created to refine or adapt it.

1. Grässle, Patrick / Baumann, Henriette / Baumann, Philippe: "Project-Orientated UML", Galileo Computing, Bonn 2000



Overview of Procedure for Business Process Modeling

First Step

Identifying Business Processes and Actors

Result: Use Case Diagrams

The starting point for business process model (like with object-oriented software development) is the determination of **use cases**. This means closed groups of activities which the company (in any form, whether as a product, supplier or information) carries out to benefit the customers or other actors. Typical use cases have names such as "Execute Tasks" or "Develop Product".

To find use cases, take a customer's (**actor**) **external view** of a company, enquire about their roles and interests (e.g. "prospective customer", "passenger"), think of the company as a "black box" and think of what different achievements the customer wants depending upon its role. Use cases found in this way are collected and, if necessary, grouped by system limits. After this, the use cases are checked to see which other actors (both other initiators (see below for meaning of this term) and merely participants: other companies, departments, information systems etc.) have relationships i.e. its environment identifies all **interfaces** of the company to be modeled.

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It is a good idea to arrange the actors which start (initiate, trigger) a use case to the left in the use case diagram and the actors which are merely involved in a running use case to the right. It is also a good idea to use verbs when naming use cases and activities; this is done to eliminate ambiguity (e.g. `Send course documents` or `Give answer` instead of merely `Course documents` or `Answer`).

The fact that this step shows a customer's view means that the model made can be used later during the software development as an aid to requirement analysis i.e. the definition of achievements which the software to be developed must and/or should be able to record. Only those things which the system allocates as achievements, not how the system realizes this internally, are the focus of this first phase.

Contact partners when gathering this information could be:

- Customers, business partners, suppliers
- External observers
- Employees with customer contact
- Members of the management

Lastly, you have to check whether all actors and use cases were really found and their relationships correctly recorded.

Second Step **Modeling Flows**

Result: Activity Diagrams, Sequence Diagrams

This phase leaves the customer view and the attention is turned towards the **company-internal processes** (internal view). Here, you can decide which individual activities (i.e. activities, movements, steps) run after one another in the company being modeled as the use case is being carried out. Here, an **activity** is a step in the process flow which should not be interrupted (see the example of an activity diagram in the figure on page D-15). Each activity is activated by the successful completion of the respective activity before it. This sort of a flow is framed by a starting point and possibly various end points.

Activity diagrams are a central instrument for modeling dynamic flows and processes. They are created for an individual use case or various use cases. You can visualize resources which are refined in the process using objects. Products which are created, altered or consumed during the process can also be visualized. They specify alternative and parallel flows and visualize conditions which resolved over various flow variants. The vertical or horizontal splitting of the diagram using so-called swim lanes makes it possible to map the organizational structures and, in doing so, the responsibilities in the diagram.

Activity diagrams can also be regarded as a special case of a state diagram: possible states of an individual object can also be recorded in them and the transitions can be visualized with the related triggers. (As an example of the term state, visualize a `Request for a loan` object with the possible states `Submitted`, `Checked`, `Processed`, `Rejected` or `Deleted`.)

When jumping from one state to another (**transition**), you can enter:

- what should activate the jump
- whether a condition has to be fulfilled
- whether an action should be carried out during the transition and which action that should be
- whether a message should be sent and to whom it should be sent

One of the greatest difficulties when modeling is the choice of complex level of abstraction and detail. In activity diagrams, you have the option to model individual activities more finely using a further activity diagram; this creates a diagram **hierarchy** which is arranged due to the level of detail each diagram contains and which can used be if required. This is also particularly recommended in diagrams which are not especially clear due to the large amount of objects and relationships in them.

Jumps within the diagram hierarchy are made using references managed by Innovator: Throughout Innovator you can select model elements and get a list of all other diagrams which contain this element using the `Jump>Reference...` menu item. In this way you can also jump directly to the diagram you want to go to.

Another possibility when modeling dynamic flows comes from the question: how companies and actors communicate with one another during when working through a use case. **Sequence diagrams** are available for this: Visualize the information exchange between the objects concerned–above all, their chronological sequence–and thereby specify their interfaces more exactly than it is possible to do in a use case diagram. Sequence diagrams also visualize which object has to be available at what point during the flow in a very clear manner. Alternatively, the **collaboration diagram** can be used for modeling message exchange, which emphasizes the constellation of objects to each other instead of a sequence of information flows over time.

The diagram types specified can be used to specify various **scenarios** i.e. you can model different situations which can occur with one another in the handling of model elements (e.g. `New customer` instead of `Customer already registered`), as well as modifications in the flows which result from it.

Possible contact partners for this step are e.g.:

- Employees
- Heads of department

Third Step

Specification of Individual Activities

Result: Activity Definition Diagrams

It is a good idea to/you should concentrate on individual activities and to ask what their overall environment looks like, i.e.:

- which objects are created, altered or processed from activities
- what company-internal and external relationships there are to other objects
- which internal and external events do the activities react upon

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- what are the possible end results of the activity

To do this, use so-called **activity definition diagrams**, which are automatically generated from the Innovator Business edition after the desired activity is selected.

Innovator Business edition then checks whether the created diagrams are consistent in themselves as well as with one another–whether e.g. all relationships are justified in an activity diagram using a definition diagram.

Modeling Static Relationships **Fourth Step**

Result: Object Diagrams

Up until now you have only internally modeled the dynamic of the flows found: It is possible to express company-internal processes using activity and sequence diagrams. The specification of internal organizational units and their relationships between the structured components are still missing.

Object diagrams show the static relationships between the objects in the model. Typical examples of use of these are

- Organization charts for specification of a company's structural organization
- target diagrams which visualize qualitative and quantitative corporate targets
- specification of objects in the model which represent products and their decomposition

Your business process model is made up of all of the steps described above and their complete results. **Result**

D-1.5 Further Processing of Business Process Models in Innovator

This chapter gives you an overview of Innovator's mechanisms which allow you to evaluate your business process models or transfer information from them into other development environments.

D-1.5.1 Process Analyses (Evaluation and Simulation)

Activity diagrams of business process modeling are the starting point of this functionality: You can store additional information (performance indicators), such as transfer probabilities, times and costs.

Aim and How to Proceed

The aim is to examine the entire process flow with regard to these magnitudes. The results are shown in a table with the determined values; you can determine the probability of a certain final state being reached and how the process costs or time are to be split in the flow using this table.

Overview of the procedure:

- Create a so-called process analysis environment and store a (hierarchical) set of activity diagrams to be evaluated.
- Create an analysis table in it and enter the additional information mentioned above either manually or transfer it into the table automatically from an activity diagram. (Or a combination of both–if you have appropriate access authorization, manually-inputted table values can also be transferred in the diagram.) The results of the evaluation are also entered in the table.
- Determine the desired evaluation refers to: what precisely you are analyzing or simulating, which input and out put values you want to view and under what specifications this should take place.
- Start the analysis and when it is finished, the result values are shown in the table created.

A variation of this is the so-called environment analysis table, which can incorporate values for several tables at the same time.

Simulative Evaluation

As well as the analytical calculation of performance indicators, there is also the option of simulatively determining the desired magnitude (i.e. over several process flows). As well as probabilities of achievement and medial process runtimes/process costs/node costs, means of waiting/operating times, as well as variations are accessible, in comparison to simulation means (variation coefficient). Additional information is contained in the user manual, chapter D-6, "Analyzing and Simulating Processes", page D-149.

D-1.5.2 Mappings in Other Innovator Editions

A central idea in the use of software modeling language UML in business process modeling is the creation of models, whose information can be transferred into a software model with the least possible extra costs (see chapter D-1.1, page D-4).

Mapping

Innovator has mechanisms which you can use to transfer model data from one of the Innovator editions to a model in another Innovator edition. These mechanisms are referred to as mapping.

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Example

In the software engineering phase called "requirement analysis" (i.e. the specification of all achievements which the software to be developed must record), the workflows typically examined are those which are to be recorded and specified in the business process modeling. You can use these and in Innovator (wherever it is a good idea or wherever it is wanted) e.g.

- use objects from the business process modeling in object-oriented software model as corresponding classes
- show them as entities in the data modeling
- or if you work with function-orientated methods of structured analysis, transfer activities from activity diagrams into corresponding data flow diagrams practically at the "touch of a button".

This is all realized in Innovator using so-called **mappings**.

Associative and Generative Mapping

The element by element illustration made up of model elements which already exist, is referred to as "associative mapping". An alternative to this is the so-called "generative mapping", which automatically generates the target elements for you; this process is automatic. Generative mapping can take place between the editions

Innovator Business > Innovator Object
(for object-oriented modeling)

Innovator Business > Innovator Data
(for data modeling)

Innovator Business > Innovator Function
(for function-oriented modeling)

Model-External References

You can jump between diagrams of different Innovator editions using the `Jump>Reference...` menu item. The dialog box of the same name has the tab tab `Model References`.

Mapping is, therefore, an important factor for the integration of Innovator editions and allow Innovator to become a modeling platform which supports you through every phase of software development–from business process analysis, software analysis and design, right through to implementation, documentation and maintenance.

D-1.5.3 Maintaining Process Models

So-called **process models** are the basis of many IT projects, as they determine individual phases and steps of software development–from project initialization, requirement analysis, implementation and testing, right through to breaking down the project structure. The lowest level contains process models of products (e.g. documents) and activities which alter and consume this product and create new products. In this way, all flows in a project are specified.

Reference Models

A reference model is the development standard for IT systems[1], which, like the majority of reference models, is designed for extremely large projects which require a reference model to be adapted to a given concrete project and to be suitably shaped. The Innovator Process edition can be used for this. You can use the so-called **tailoring operation** to delete all requirements which are not necessary for your project from the reference model.

Tailoring

Tailoring operations can be linked to the availability of certain conditions which determine when a deletion operation can be carried out. Alternatively, a so-called user-defined tailoring can be carried out, although only one justification text will be attached.

The two types of tailoring operations can be further distinguished between:

- **Direct tailoring operations**: they are dependent on conditions.
- **Indirect tailoring operations**: they are dependent on direct tailoring operations.

To simplify handling full of recurring project types you can combine a set of direct tailoring operations which should be carried out as one unit with a so-called project type (e.g. "Large technical IT project", "Small administrative IT project").

This allows you to distinguish between three types of tailoring:

- **VT = tailoring according to project type:** this happens when the "automatic" project type is selected.
- **AT = tender-relevant tailoring:** when the process model is created, you immediately determine which activities are superfluous and delete these.
- **TT = technical or conditional tailoring:** in contrast to AT, you determine which activities will probably (!) be superfluous during the project; these can then be deleted in the course of the project and remain undeleted for the time being. Deleted activities can also be attached.

Creating Your Own Reference Model

It is not only process models which can be used across the Innovator editions; there is also a useful connection to Innovator Business edition: the fact that you can create and maintain process models you have designed yourself in Innovator also means that you have the option of going the other way i.e. from business process model to process model. This means you can

- create a process model with the tools in the Innovator Business edition and
- automatically transfer this to a reference model for the Innovator Process edition, which is then available for tailoring operations and concrete projects.

A possible use of process models in Innovator is the generation of a project manual which can integrate additional external objects–e.g. Innovator diagrams or Word/Excel documents.

1. You can find more information under www.v-modell.iabg.de or www.iabg.de/infokom/software_einfuehrung/v-modell_en.php.

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D-1.5.4 Connection to Version Management Tools

Although Innovator has its own version management, each edition has the option of transferring objects from Innovator models in version management systems. You can find out more information from the online help.

D-1.6 Configuring the Innovator Business edition Edition

The following examples are designed for Innovator Business edition users who want to configure Innovator's modeling options. However, if you are only interested in process modeling based on configurations which come with the delivery–which will apply for most cases–then you do not need to read this chapter.

Pre-Configured Models

If you want to create a new business model in the Innovator Business edition, specify a so-called profile as model template or select `empty model`. The new model comes with a standard model in which common diagram types (see chapter D-1.3, page D-14) and model elements which can be used in them (actors, activities, objects etc.) are already created.

You can use the pre-configured profiles, such as "Office Process" when configuring a new model and, in doing so, solve an array of modeling tasks.

Innovator Business edition can also help before you have even started the task of specifying your model using self-defined and problem-specific adapted diagram types. As well as the **process model** made–the "actual" company model–, you can also create or modify a so-called **configuration model** by

- defining your own diagram types
- determining which objects and object relationships should be enabled in the new diagram type
- ensuring that your defined diagram types are added to the `Element> New Diagram><Diagram Type>` menu (which you can also configure) of the model browser.

Why Configure?

What are the targets of a configuration?

- A basic vocabulary and a pool of basic elements should be defined for the model to be created.
- Frequently used model elements should be able to be easily created, i.e. there should be minimum effort involved for an element to contain the desired properties.
- In a diagram, model elements (and only those) which are needed at that moment or necessary should be able to be attached.

- The most important element properties should be able to be shown when required in the diagram as standard.
- Model elements are stored in the "right" place (e.g. package)–i.e. where they belong based on their contents and consequently where you also think they should belong.

Some basic terms should be introduced before giving an overview of the configuration procedure:

Package

The configuration of Innovator Business always takes place using packages and their content. In general, a package combines a set of model elements into one unit e.g. such as the `Floppy Disk`, `CD-ROM`, `Document`, `File` etc. classes in the `Information Carrier` package in the "Office Process" example.

Every package is provided with a stereotype, which determines which element types can be assigned to the package. (You can set where the new model entries with certain properties should be stored in the model tree via the `Model>Configuration>Packages>Properties...` menu and tabs such as `Create Defaults` etc.)

Namespaces can be linked to packages; this refers to areas in the model in which names should be unique. However, in other namespaces, a certain name can only be reused once within a namespace.

Model Templates

When configuring a new business process modeling project, Innovator asks you to select a model template. Properties of model element types and templates for model elements are preset in the model templates: **element properties**, **profiles** and **configuration models** are stored here. belong to the model options stored in the model template.

- Defining stereotypes and properties of elements
- Creating relationships between model elements
- Diagram properties (e.g. permissible elements, create defaults)
- So-called templates for creating model elements
- Fonts and colors

More precisely: you implicitly opt for one profile and one configuration model by selecting model template!! You can recognize this as package structures–displayed in the model tree, in the left-hand area of the model browser–are provided for you in the model browser upon opening the repository.

Element Properties

Element properties are part of a model template's model options and form the basis for the entire configuration process. With them (i.e. via the `Model>Configuration>Element Properties...` menu) you can arrange an element's properties (e.g. stereotype, visibility, isroot, isleaf) as well as their respective desired values (for stereotype, e.g. «activity type»,

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«class», «type», «interface»,...); in addition, you can determine its appearance by selecting names and icons. The most important property of an element is usually its stereotype.

Profile

A profile is a part of a model template in which a model template can have various profiles. Technically speaking, a profile is a set of (hierarchically structured) **packages** with certain elements in them. Profiles are used to create pre-defined structures in the model tree which are available immediately once it has been opened for the first time. Correspondingly, there are commands for defining and inserting profiles.

A prerequisite for your own profile is a suitable model template, which, in particular, must contain stereotypes for packages and dependencies between packages.

Note

When talking about UML specification (see chapter D-1.1, page D-4) of a "UML Profile for Business Modeling", "profiles" in Innovator refer to something which is most like a model template i.e. a profile together with a configuration model.

Configuration Model

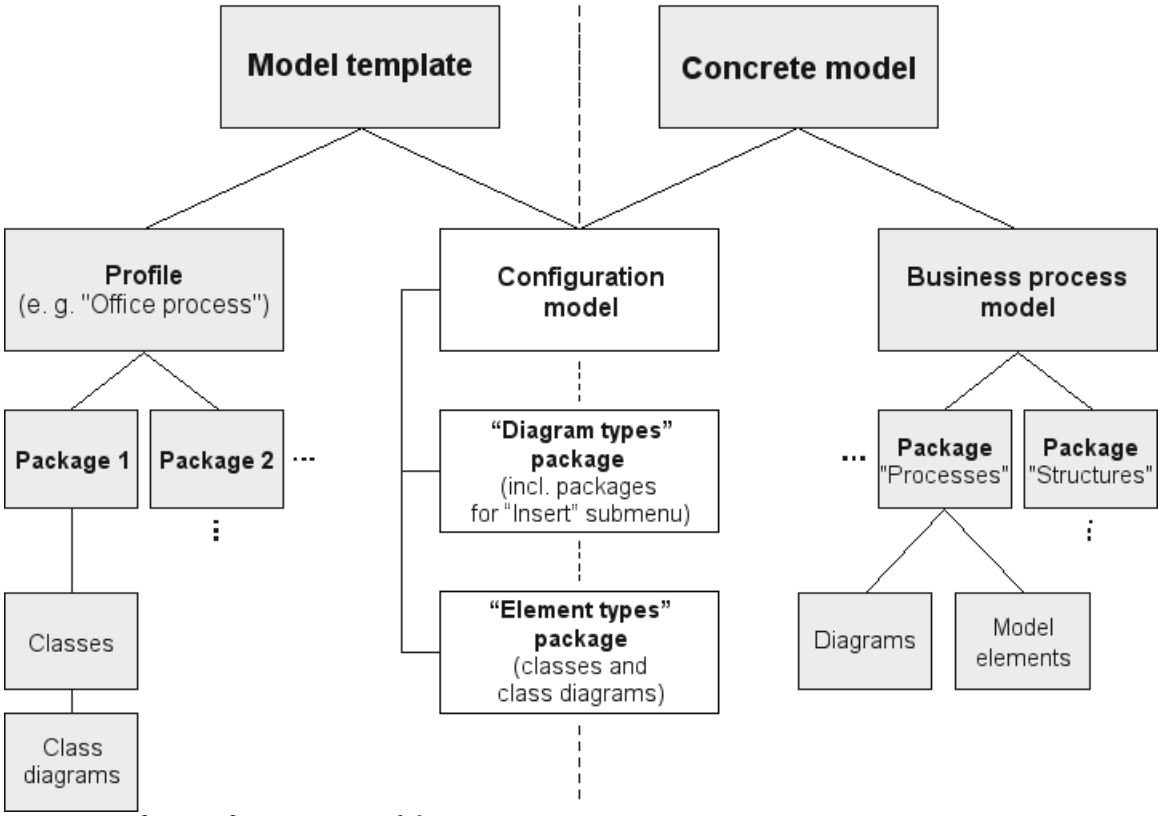
Important: **configuration models are only a specialty of the Innovator edition Business!** This technique is not available in other editions.

Important or required elements in a concrete business process modeling project are determined in the "Configuration Model" package, i.e.

- **Diagram types** (in a «configuration diagrams» package stereotype)
- and the enabled **classes of model elements** and relationships between these (in a «metamodel» package stereotype).

Based on the existing basis types of diagrams, own diagram types can be defined as subtypes and in doing so, the desired element types (of activities, objects, messages etc.) can be chosen.

To conclude, the following diagram shows the inserted terms with regard to their relationship between themselves listed below: the right half of the picture shows your concrete model in Innovator, whereas the left half contains the underlying model template. The configuration model can be regarded as a "bridge".



Meaning of a Configuration Model

What should you do if you want to define a new diagram type in your model?

- Create a new package with the name of this diagram type in the model browser under `Configuration Model::Diagram Types` and determine its stereotype:
  - «configuration objects» for an object diagram type
  - «configuration process» for an activity diagram type
  - «configuration collaboration» for a collaboration diagram type
  - «configuration sequence» for a sequence diagram type
- In this package, set references to all model elements (classes which can be found in the configuration model under "Types") which should occur in your diagram.
- Which relationships should be allowed between the selected model elements in the new diagram are also determined in the subtree "Types" using class diagrams; however, please note that this will apply to **all** diagram types! This means: if a model element is enabled in two different diagram types, its relationship rules are introduced into both diagram types–from the same class diagram.

Once you have completed everything and, if necessary, updated the model browser's display, Innovator Business edition automatically puts your defined diagram type in the correct menus `Element>New Diagram`. (Read how to extend these using your own submenus in the chapter below.) After such a diagram has been created, you can also see that symbols belong to the model elements enabled within the diagram, i.e. the user interface consistently adapts to your diagram type.

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More Information

- chapter D-7, "Setting the Use of Elements in the Configuration Model", page D-181
- chapter A-3.3.3, "Exporting Structure Templates", page A-58

D-1.7 Innovator Business edition Edition Deviations from UML 1.4

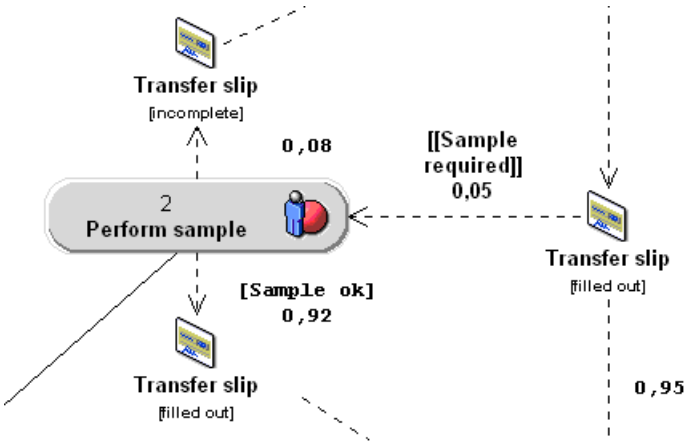
This chapter contains an overview of all Innovator Business edition functions which differ from the UML 1.4 standard language.

For more detailed information, please read the respective user manual chapters.

Note

- **Model Element Conditions**

In UML activity diagrams, conditions exist as results of actions. However, if you want to model conditions which do **not** result from activities in the model (such as e.g. weekday = Monday), you can do this using so-called global conditions. In diagrams, conditions are enclosed in [[.]] brackets and, as conditions, can include information about the probability of their occurrence.



Example of a "Sample required" Global Condition and a "Sample ok" Condition (with the Probability of its Occurrence)

- **Calls or Messages Between Activities are Possible**

No direct calls or messages are realized between activities in the UML. This can be used to simplify matters in the Innovator Business edition.

- **No Synchronous/Asynchronous Calls or Messages in Sequence and Collaboration Diagrams**

Diagrams in UML can contain both synchronous (waiting for responses) and asynchronous (maintaining flows) calls or messages; however, only "calls" or "messages exist in the Innovator Business edition without differentiation, so that clarity can be maintained in the model.

- **Only One Action per Transition is Possible in a State Diagram**

You can no longer specify a list of actions which are separated from each other using semicolons.

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- **Activities in Object Diagrams**

Activities represent a special case in object diagrams, as they are actually part of the dynamic model of the company. They are, however, not necessarily free of static aspects. If the modeler requires the activity hierarchy 1:1 refers to the hierarchy of the aims, he can already model the activity diagrams in the object diagram and assign aims to the activities.

The primary means of modeling activity hierarchies should, however, only be by refining activities using activity diagrams.

D-1.8 Glossary

Actor	Role of a person or system outside of the modeled system which interacts with it
Activity	Sub step of a flow/process/use case
Requirements Analysis	Specification of all achievements and functions which the software to be developed has to realize
Use Case	Closed sequence of interactions between an (external) actor and a system which brings an actor a result.
Association	Relationship or connection between model elements
BM CASE Mapping	Mapping elements from the business model (BM = business model) in another Innovator edition for further processing in the CASE area
BPR	Business process reengineering
CASE	Computer aided software engineering
Edition	Model type-related, licensed collection of functions of the Innovator modeling platform (Business, Object, Data, Function, Report)
Property Value	Extends the properties of a UML element
Event	Triggers activities or transitions
Business Process	Closed sequence of activities for working through a use case
BPM	Business process modeling
Initiator	Actor who triggers a use case

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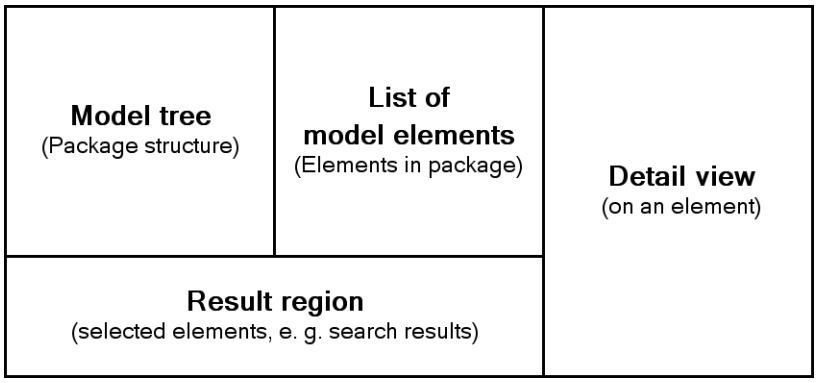
Class — Specification a set of objects or activities that are the same with regard to their attributes, methods and the set of possible relationships

Configuration Model — Collecting of element properties and packages for model configuration

Mapping — Transformation mechanism between Innovator editions

Model Browser — User interface for navigation in the model. Is displayed when the model is opened and is divided into four areas:



Model Browser Area

Model Element — Element of your model i.e. typically everything that you can insert in a diagram

Model Templates — Contains the configuration model with the configured diagram and element types, their properties and templates, as well as the profiles based on these with pre-configured model elements and -structures

Message — a) Calling an operation
b) General: Triggers an event

Namespace — Area in the model in which the names are unique. Linked to a package

Object — Realization of a class, an actual instance

OMG — Object Management Group

Package — Basket for a set of model elements

Special sets of packages and their contents for configuration of Innovator Business edition	**Profile**
Collection of all a company's modeled business processes in the form of diagrams and the model elements within them	**Process Model**
Reference to a model element or a diagram	**Reference**
Data representation of a model; basis of data management in Innovator	**Repository**
A collection of settings is used for creating objects (e.g. name, properties). This is not to be confused with configuration of your own diagram types, which is deeply integrated into the model	**Template**
Perspectives which view an object	**View**
Extension of UML vocabulary for classification of classes, comparable to the metaclasses in the former metamodel	**Stereotype**
a) Modeling of an alternative flow b) Selected mapping rule	**Scenario**
Transition between two activities or states	**Transition**
Unified Modeling Language (object-orientated modeling language; standardized)	**UML**
Abbreviation for process model; also refers to the development standard for IT systems which is currently published as V-Modell®XT by the KBSt (Federal Government Co-ordination and Advisory Agency)	**V-Model**

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D-2 Information about Objects, Activities and Actors

The diagrams in the Innovator Business edition show the behavior and properties of people, objects and activities, as well as their relationships to one another. They examine structures and flows in your company.

Each one of these diagrams displays different aspects, e.g. relationships between objects are shown in an object diagram, time flows of communication between actors or objects are shown in Sequenzdiagramm, the various process flows are shown in activity diagrams etc.

As different as the Elements used are, the same ideas and concepts are still at the heart of them. This means that there will always be similar functions in the various Elements. These functions make up the contents of the following chapters.

Note

Whether actors or activities, the following specifications apply to all of these element types. To make the document easier to read, the term `Element` is often used to encompass `objects, activities and actors`.

To be able to create all of the elements named above, the model administrator needs to have stored elements–i.e. classes–. The following pages will use the terms `class` and `configured type` synonymously.

You will learn:

- how to create and modify Elements (see page D-38)
- how you assign Elements to another configured type (see page D-38)
- how you specify elements using attributes (see page D-50)
- how you modify an Element's display (see page D-57)

Diagram Types

The following diagram types are available for business process modeling:

- Sequenzdiagramm
- Kollaborationsdiagramm
- Object diagram
- Activity diagram

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Note **In business use case diagram, only the actors correspond to the above mentioned Elements. The other element types in this diagram (business use case and system) are organized in a different way. However, handling with the Elements is also similar to how it is in the other diagrams.**

D-2.1 Creating and Modifying Objects, Activities and Actors

A prerequisite must always be met when creating actors, as well as when creating activities and objects: a class (i.e. a configured type) is provided in the model which makes the basis of the Element (see chapter D-7.3, "Preparing Classes for Elements", page D-187). If this is not done, then the necessary command will not be offered in the diagram editor's menu.

Note **The following pages will use the terms `class` and `configured type` synonymously.**

In the following chapter you will learn how to

- Elementcreate s of a certain configured type (see page D-38)
- Elementrename s (or their references) (see page D-42)
- Elementassign s to another configured type (see page D-46)
- Elementassign properties to s (or their references) (see page D-49)

D-2.1.1 Creating Objects, Activities and Actors

Every employee, object and activity which are involved in the structures and flows of your company can be displayed as actors, objects or activities in Innovator and placed in relation to other Elements.

In object diagrams, you are normally limited to viewing fixed (static) structures and responsibilities. Flows are mainly shown in the diagrams of the dynamic model (i.e. activity, sequence and collaboration diagrams).

Note **Actors can only be created in diagrams, and not in the model browser. You can create activities and objects in both the model browser and in diagrams.**

Prerequisites

To be able to create an Element (in a diagram or using the model browser), the following prerequisites must be fulfilled:

- A class is provided for every type of object, activity or actor in the model (see chapter D-7.3, "Preparing Classes for Elements", page D-187). You can create as many Elements as required using these configured types.
- Elements of this element type are permissible in the package in which you want to create the Element in (see chapter A-3.4.1, "Setting Permissible Elements", page A-60).

If you want to create an element in a diagram, the following additional prerequisites must be fulfilled:

- Several types of object and activity diagrams etc. can be configured in the model. In turn, various configured types (classes) of Elements can be permissible in all of these types of diagrams.

  To be able to create Elements (of a certain type) in a diagram (of a certain type), the Element's class needs to be assigned to the type of diagram (see chapter D-7.4.2, "Offering Activities, Objects and Actors in Menus", page D-193).

Note

Elements are created in the package where the diagram is also stored as standard. However, your model can also be configured in such a way that Elements are diverted to another target package once created (see page A-68). If you can't recover the Element which has just been created in the diagram's package, ask your administrator about the configuration of you model.

Other Information

- chapter D-7, "Setting the Use of Elements in the Configuration Model", page D-181

Procedure

In the Innovator Business edition, objects, activities and actors are always assigned to a class (i.e. the configured type). If you create such an Element, you first have to decide which type this element is from, i.e. which class it originates from.

Note

You can also assign a class to an element at a later date (see page D-46).

In another step you have to decide whether you will

- create a new Element of the selected type in the model and allow it to be seen in the diagram (see page D-40)

  or

- create a (further) display of an Element which already exists in the model (see page D-41)

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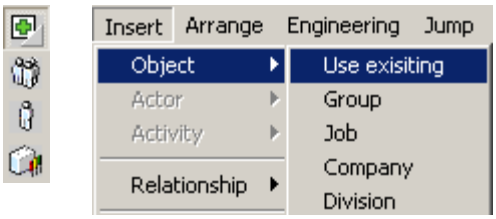
The Insert><Element Type> menu contains a menu item Use Existing, which serves as a switch for the corresponding behavior of the menu item Insert. The Use Existing menu item switches between creating a new instance and inserting an instance which already exists. Once it is activated, it is shown in the toolbar for all element types affected on the left-hand side.



Symbol and Use Existing Menu Item in the Example of an Object Element Type

If the Use Existing menu item is activated, use the Insert><Element Type>><Class> menu item to call up the dialog box of the same name and select the added instances (see chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74).

Note **An Element's various existences are referred to as an Element's references.**

You can create activities and objects in both the model browser and in diagrams. You can only create these elements in the model browser; you cannot create a further existence of an element which already exists. The menu structure in the model browser is therefore different from the one in the diagrams (see page D-189).

Creating a New Element

In the Insert><Element Type> menu of your diagram, all classes which are provided for the diagram of the current, configured type are shown (see chapter D-7.4.2, "Offering Activities, Objects and Actors in Menus", page D-193). It also contains a menu item Use Existing, which serves as a switch for the behavior of the Insert menu.

How to proceed

To create a **new** Element of a certain class:

» Jump to the diagram and lock it.

» Make sure that the Insert><Element Type>>Use Existing menu item is deactivated. You can also see if this is done from the corresponding icon in the toolbar on the left-hand side.

If you do not enter a position for the Element, a default position is selected.

» If you want to create the Element in a certain position, click on this position.

  In the `Insert` menu, an entry will be shown for every element type which is possible in the current diagram. In some cases, all classes which are configured for the current diagram are listed below in a submenu.

» In the `Insert><Element Type>` menu–and if necessary in one of the submenus–select desired class (type).

  The new Element is created. It contains the names of the class as standard.

Creating Further Existences of an Element

You can display each Element as many times as necessary–whether it be in the same diagram or another one. If an Element already exists, select it during creation and, in this way, create another existence from it.

How to proceed

To create a **further existence** of an Element:

» Jump to the diagram and lock it.

» Make sure that the `Insert><Element Type>>Use Existing` menu item is activated. You can also see if this is done from the corresponding icon in the toolbar on the left-hand side.

  If you do not enter a position for the Element, a default position is selected.

» If you want to create the Element in a certain position, click on this position.

  In the `Insert` menu, an entry will be shown for every element type which is possible in the current diagram. In some cases, all classes which are defined for the current diagram are listed below in a submenu.

  In the `Insert><Element Type>` menu of your diagram, all classes which are configured as permissible for the current diagram are listed.

» Select the desired class in the `Insert><Element Type>` menu.

  A dialog box appears in which all elements which already exist in the model are listed.

» In the dialog box, select the Element to which you want to create a further existence (see chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74).

  The Element is displayed in the diagram.

Note

If you insert an element into an object diagram which already has relationships to other objects in the diagram and if the diagram does not contain any multiple references, then all relationships to the objects in the diagram will be show (see chapter B-2.1.3, "Displaying Relationships to Model Elements from Other Diagrams (Maintenance Status)", page B-24).

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Element Copy

You can copy an Element and copy it again (into the current diagram or any number of other diagrams **of the same type**) as many times as required. This means that Element references are also created.

How to proceed

To copy an Element:

» Select the Elementyou want to copy and select `Edit>Copy`.

How to proceed

To insert the Element:

» Open the diagram where you want to insert the Element and lock it. Make sure that the diagram is of the same type as the original.

» Select `Edit>Paste`.
The Element is inserted in the diagram.

Other Information

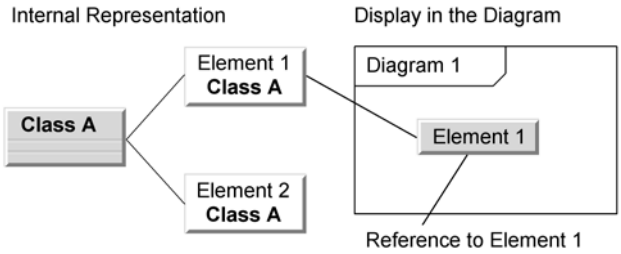
- chapter D-2.1.2, "Renaming an Element", page D-42
- chapter D-2.1.3, "Determining an Element's Class (Configured Type).", page D-46
- chapter B-2.3.2, "Moving Elements in Another Package", page B-53
- chapter B-2.5, "Removing and Deleting Elements", page B-61
- chapter D-2.3, "Modifying the Display of Elements", page D-57

D-2.1.2 Renaming an Element

You can rename objects, actors and activities in the Innovator Business edition diagrams. When carrying out this seemingly uncomplicated procedure, you will come across a dialog box which contains settings options which, at first glance, do not appear to be in any order. The following sections show which concepts are behind the way the elements are shown in the diagrams and help to understand the required dialog boxes. Read how to rename a Element in page D-45.

Element Vs. Reference

One and the same Element can be displayed as many times as required in the Innovator Business edition's diagrams (excluding class diagrams). Therefore, you only see references to the Element here. Each reference shows exactly one Element.

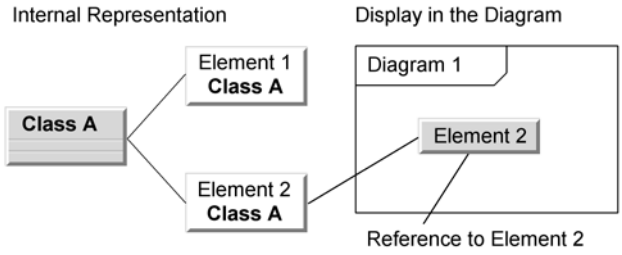


An Element's Reference Before Being Renamed

If you rename one of these references, it is shown on another Element (of the same class). It is not essential to rename the Element. This means that the renaming of an Element in the diagram is more like **transferring the reference** to another Element.

Note

If you want to make such a modification in the object diagram, the static relationships of the objects which were visualized on the renamed reference are also affected. The new model also has these relationships once the reference is transferred.



An Element's Reference After Being Renamed

Two situations are distinguished between:

- The Element which you want to transfer the reference to already exists in the model.
- The Element which you want to transfer the reference to does not already exist in the model.

Another Element Already Exists

This is the simplest case: If the other Element already exists, the reference only has to be transferred (see figure on page D-43).

Another Element Does Not Already Exist

On the other hand, if the other Element does not exist in the model, it can be created when the reference is transferred.

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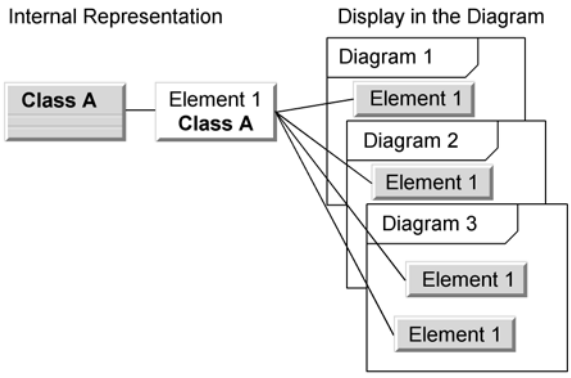


Starting point: the Element to which a reference is to be renamed does not already exist in the model.

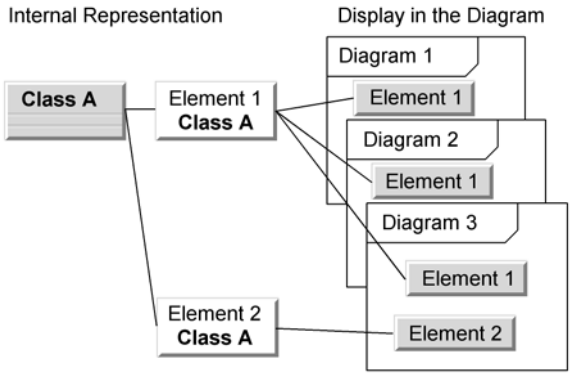
Two further possibilities are distinguished between:

- The original Element contains other references which should not be renamed.

  Then

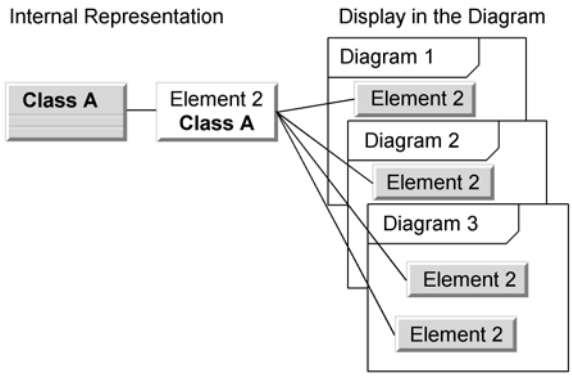
  - the new Element is created
  - the reference is transferred

  The other references remain references of the previous Element.



If the original Element contains further references, a new Element is created and the reference is transferred

- After the reference is transferred, the original Element will not contain a graphic display.
  - The original Element is then renamed.
  - The references show the same, now unnamed, Element.



If all original Element's references are renamed, this Element will also be renamed.

Renaming an Element's Reference

You cannot immediately see whether further references exist in an Element in the diagram.

Note

You can see which other diagrams are already displaying theElement. To do this, select the Element and go to `Jump>Reference...`. All diagrams which already have the Element displayed are listed in the tab `This Model`.

Regardless of whether other references to the Element already exist, you can still determine how to proceed with these–if they should exist.

The following possibilities are available to you when renaming:

- `Nur diese selektierte Referenz des <Elementtyps>`: if more than one reference exists for the current Element, only the current one is renamed (see figure on page D-44).
- `Alle Referenzen des <Elementtyps> in diesem Diagramm`: an Element can be displayed within a diagram more than once. All of these references are affected by the modification. references to the same Element in another diagram are not affected by the modification (see figure on page D-44).
- `<Element type> and all references`: all of the Element's references which exist in the model are renamed (see figure on page D-45).

How to proceed

To rename an Element (and in doing so, transfer the reference to another Element):

» Lock the diagram.

» Select the Element and lock it as well.

» Select `Edit>Properties...`.
The dialog box of the same name appears.

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» If applicable, select the tab Name.
All Elements which are stored in the current package are listed in the drop-down list Name (see page A-68).

» Select an Element from the drop-down list Name

or

» Enter your name in the field Name.

or

» Click on [Select].
The dialog box Choose Item appears. Read how to work in this dialog box in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» To determine which Element's references should be renamed (i.e. assigned to the new element), activate one of the junctions in the group box Effect in the dialog box Edit/Properties.

» Finally, close the dialog box with [OK].
The references are renamed (assigned to the other Element).

D-2.1.3 Determining an Element's Class (Configured Type).

Elements in the Innovator Business edition's diagrams always stem from a class which is stored in the model.

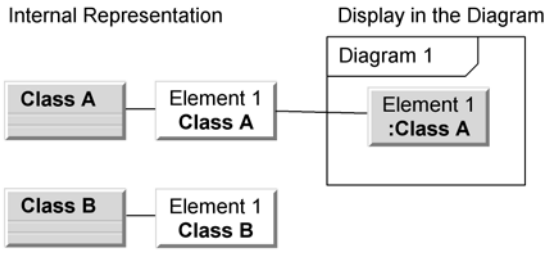
If you create an Element, enter the class (see page D-38). However, you can assign the Element to another class later on.

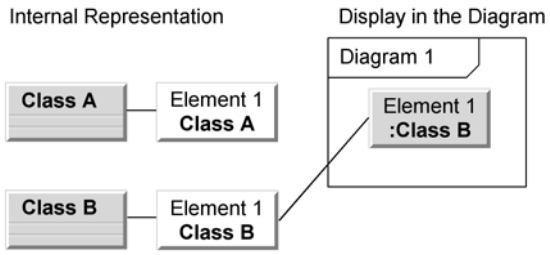
For every Element's references you can determine that its respective Element of another class should be assigned. The following variants are possible:

- An Element of the same name already exists for the other class.
- The other class still doesn't have an Element with the same name and must first be created.

An Element of the Same Name Already Exists

If an Element of the same name already exists for the new class, the references affected will only be transferred to this other Element.

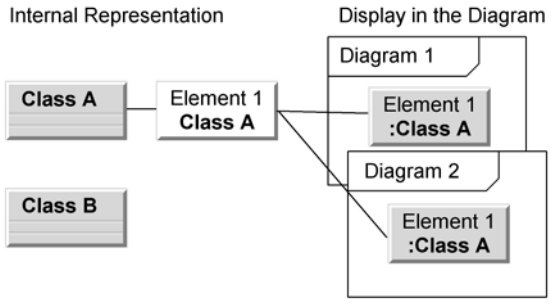




If the Element of another class already exists then only the reference will be transferred

Creating a New Element

On the other hand, if an Element of the same name does not already exist for the new class, it is created.



Starting point: The Element to which a reference is to be renamed does not already exist in the model.

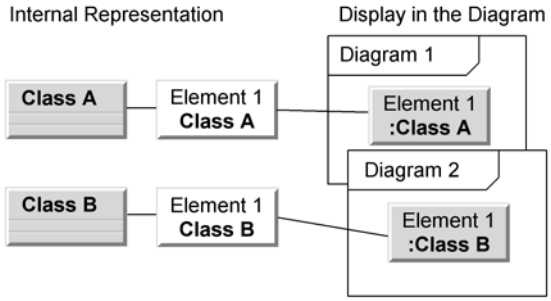
Two possibilities are distinguished between:

- The original Element contains other references which should remain assigned to the previous Element (the previous class).

  Then

  - the new Element is created for the other class
  - the reference is transferred

  The other references remain references of the previous Element of the previous class.



If the original Element contains further references, a new Element is created and the reference is transferred

- After the reference is transferred, the original Element will not contain a graphic display.
  - The original Element is then assigned to the other class.

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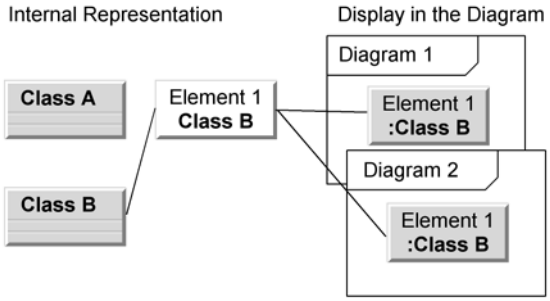
- The references show the same Element, which has now, however, been assigned to another class.



If all original Element's references are renamed, this Element will also be assigned to another class.

Setting the References Affected

You cannot immediately see whether further references exist in an Element in the diagram.

Note

You can see which other diagrams are already displaying theElement. To do this, select the Element and go to `Jump>Reference...`. All diagrams which already have the Element displayed are listed in the tab `This Model`.

Regardless of whether other references to the Element already exist, you can still determine how to proceed with these–if they should exist.

The following possibilities are available:

- `Nur diese selektierte Referenz des <Elementtyps>`: if more than one reference exists for the current Element, only the current one is assigned to the other Element (to the other class).
- `Alle Referenzen des <Elementtyps> in diesem Diagramm`: an Element can be displayed within a diagram more than once. All of these references are affected by the modification. References to the same Element in another diagram are not affected by the modification.
- `<Elementtyp> und alle Referenzen`: all of the Element's references which exist in the model are renamed.

How to proceed

To assign an element to another class at a later date:

» Lock the diagram.

» Select the Element and lock it as well.

» Select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Class`.
  All classes which exist in the current package are listed in the drop-down list `Name` (see page A-68).
» Select a class from the drop-down list `Name`
  or
» Enter your name in the field `Name`.
  or
» Click on `[Select]`.
  The dialog box `Choose Item` appears. Read how to work in this dialog box in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.
» To determine which Element's references should be affected by the modification, activate one of the junctions in the group box `Effect` in the dialog box `Edit/Properties`.
» Finally, close the dialog box with `[OK]`.
  The references which you have specified are assigned to the new Element of the new class.

D-2.1.4 Specifying an Object's or an Actor's Properties

You can assign properties to an object or an actor; these specify which role the Element plays in the current scenario:

- `Actor`: the object acts temporarily as an actor in the flow.
- `Active`: the Element is actively involved in the communication, which does not necessarily have to be initiated. Elements which are assigned as actors are also always active. Active Elements are shown with a black frame.

In addition, using the `Multiple object` property, you can see that various Elements (of the same class) are involved or can be involved. Multiple objects are shown by two consecutive Elements.

How to proceed

To assign Element properties:

» Lock the diagram.
» Select the Element and lock it as well.
» Select `Edit>Properties...`.
  The dialog box of the same name appears.
» If applicable, select the tab `Properties`.
» Activate the check boxes for the properties you want to assign to the Element and close the dialog box with `[OK]`.

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D-2.2 Working with Attributes and States

Objects, activities and actors can contain attributes. You can assign and view concrete values to these in the Innovator Business edition diagrams. If there aren't any attributes which you want out of the ones offered, then you can attach your own.

You can

- attach, modify and delete attributes (see page D-51)
- display or hide individual attributes (see page D-53)
- assign values to attributes (see page D-54)

In addition, you can assign a state to objects and actors in collaboration and activity diagrams. If there aren't any states which you want out of the ones offered, then you can attach your own.

You can

- attach, modify and delete states (see page D-51)
- display or hide states in all diagrams (see page D-53)

Use of Attributes

- You can **distinguish** various elements of a class from one another using attributes. e.g. all objects of the `Employee` class can have the `Surname` attribute. The attribute's values are then e.g. `Smith`, `Baker`, `Clark` etc.
- If you define the current **state of an Element** using the values of all of its attributes at a point in time, you can use the attributes in the diagrams of the dynamic model to e.g. show how an element will be modified throughout its existence.
- You primarily use attributes of activities in an activity diagram for the **analysis and simulation** of flows (see chapter D-6, "Analyzing and Simulating Processes", page D-149).

Types of Attributes

There are three types of attributes:

- **Class-wide attributes:** these are attributes who value must be identical for all Element's of a class. Their value is already preconfigured in the model configuration and this cannot be altered in the Innovator Business edition's diagrams (excluding class diagrams). Class-wide attributes are shown as underlined (as long as you have displayed them).
- **Object-wide attributes:** these attributes can individually have a value for every Element. However, each of this Element's references contain the same values.

  These attributes are also referred to as **global attributes** in the diagram types sequence, collaboration and activity diagram.
- **Reference-based attributes:** every existence (i.e. every reference) of an Element can have its own attribute value.

  These attributes are also referred to as **local attributes** in the diagram types sequence, collaboration and activity diagram.

Note

The differentiation between global and local attribute values does not apply in object diagrams, as only attributes whose values during the life of the object remain the same are shown here (the object diagram belongs to the static model).

However, you can use both object-wide and reference-based attributes in all diagrams of the dynamic model (sequence, collaboration and activity diagram types).

Attribute configuration is set regardless of whether you can assign an attribute value for all an Element's references or for each individual reference separately (see page D-202). If you cannot modify an attribute as required, ask your administrator.

D-2.2.1 Adding and Modifying Attributes

Which attributes the objects, activities and actors can have is normally already determined in configuration. In individual cases, it can, however, be essential to add further attributes to the pre-configured ones.

Note

Attributes which are already pre-configured can only be modified and deleted by the administrator. You cannot modify or delete these in the Innovator Business edition's diagrams (excluding class diagrams).

Adding an Attribute

You can add as many attributes to an Element as you like. To do this, assign a name and set the attribute type.

Values of attributes which you added to an object are always only available for the current object's reference (reference-based attribute).

Note

The possible types which you can assign to an attribute are provided in the model's configuration (see chapter D-7.5.6, "Creating Attribute Types Activities, Objects and Actors", page D-209). If the necessary type is not available, ask your administrator.

Note

If you want to carry out process analyses, base these on performance indicators such as costs, probabilities and times. These are modeled as attributes of activities. For more information, read chapter D-6.1.3, "Assigning Probabilities to Conditions", page D-157.

How to proceed

To add an attribute:

» Lock the diagram.

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» Select the Element which you want to add an attribute to and lock it as well.

» Select Edit>Properties....
The dialog box of the same name appears.

» Select the tab Attributes.
All attributes which contain the current Element are listed in the column Name. All classes which form the basis for the attribute in the configuration are listed in the column Type.

» Enter the name of the new attribute in the field in the column Name.
The [Add] button is activated. The types which can have attributes are listed in the drop-down list next to the field.

» Select a type from the drop-down list

or

» Click on [Select].
The dialog box Choose Item appears. Read how to work in this dialog box in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» To transfer the new attribute in the column Name, click on [Add] in the dialog box Edit/Properties.

» Finally, close the dialog box with [OK].
The attribute is added to the element. In the diagrams which differentiate between object-wide and reference-based attributes, the attribute only applies to the current reference.

Other Information

- chapter D-2.2.2, "Showing an Attribute", page D-53
- chapter D-2.2.3, "Assigning Attribute Values", page D-54

Modifying Attributes

You can modify an attribute which is not pre-configured. Read how to modify an attribute's value in chapter D-2.2.3, "Assigning Attribute Values", page D-54.

How to proceed

To modify an attribute:

» Lock the diagram.

» Select the Element whose attributes you want to modify and lock it as well.

» Select Edit>Properties....
The dialog box of the same name appears.

» Select the tab Attributes.
All attributes which contain the current Element are listed in the column Name.

» Select the attribute that you want to modify.
The button Modify is only activated if you are trying to modify an attribute which is not already pre-configured.
» Make the modifications you want to and click on [Modify].
» Finally, close the dialog box with [OK].

Deleting an Attribute

You can delete an attribute which is not pre-configured.

How to proceed

To delete an attribute:

» Lock the diagram.
» Select the Element whose attributes you want to modify and lock it as well.
» Select Edit>Properties....
The dialog box of the same name appears.
» Select the tab Attributes.
All attributes which contain the current Element are listed in the column Name.
» Select the attribute that you want to delete.
The [Delete] button is only activated if you are trying to modify an attribute which is not already pre-configured.
» Click on [Delete].
» Finally, close the dialog box with [OK].

D-2.2.2 Showing an Attribute

You can individually show or hide attributes which exist for an Element.

How to proceed

To show the attribute values in the Element:

» Lock the diagram.
» Select the Element you want to enter attribute values for and lock it as well.
» Select Edit>Properties....
» The dialog box of the same name appears.

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» Select the tab `Attribute Display`.
All attributes which contain the current Element and are currently not shown are listed in the list box `Attribute`. All attributes which are already shown are listed in the list box `Displayed attributes`.

» In the list box `Attribute`, select the attribute whose value you want to show and click on `[»»]` to transfer it to the list box `Displayed attributes`.

» To change the sequence in which the attributes are shown, select one of the attributes in the list box `Displayed attributes` and move it to the desired position using `[Up]` or `[Down]`.
Enter whether you want to be able to see the attribute's names, current value and/or type using the check boxes in the group box `Display`.

» Enter which of the attribute's components should be shown using the check boxes in the group box `Display`.

» Click on `[Apply]`. Repeat this step with all attributes which you want to be able to see.

» Finally, close the dialog box with `[OK]`.
Read how to modify how an Element looks in chapter D-2.3, page D-57.

D-2.2.3 Assigning Attribute Values

You can assign a value to every attribute of an Element–as long as it is not defined as a class-wide attribute. Which references of an Element the value affects depends on the attribute's configuration.

Note **In object diagrams, all attribute values apply to all references of an object.**

How to proceed

To assign a value to an attribute of the current Element:

» Lock the diagram.

» Select the Element you want to enter attribute values for and lock it as well.

» Select `Edit>Properties...`.
The dialog box of the same name appears.

» Select
- the tab `Attribute Values` for objects in the object diagram
- tab `Values (Global)` for Elements in all other diagrams of the dynamic model **and** if the attribute value should apply for all references of an object

- tab `Values (Local)` for Elements in all other diagrams of the dynamic model **and** if the attribute value should only apply for the current reference of an object.

All attributes which are defined for the Element are listed in the column `Name`. Only the attributes which are defined as reference-based attributes are listed in the tab `Values (Local)`. The respective current value of the attribute is shown in the column `Value`–as long as it is already defined. In a locked state, the `Type` and `Format` columns which list the assigned type and format for each attribute are also shown.

» Select the attribute whose value you want to modify in the column `Value`.

» If a list type is assigned to the attribute, select one of the values defined during configuration.

» Otherwise, enter the attribute's new value in the entry cell.

» In this way, assign all required attribute values.
As long as configured, the column `Format` can show which form the attribute value is expected in, e.g. `dd.mm.yyyy` for date specification (see page D-203). If this information is missing, if necessary, ask your administrator for the correct format.

» Click on `[Apply]` and close the dialog box with `[OK]`.

D-2.2.4 Adding and Modifying a State

Which states the objects and actors can have is determined in configuration (see chapter D-7.6, "Setting Possible States for the Element (State Diagram)", page D-209). In individual cases, it can, however, be essential to add further states to the pre-configured ones.

Note

In contrast to attributes, you can only display or hide states in all diagrams. For more information, read chapter D-2.3.2, "Modifying Elements' Labeling", page D-58.

Adding a State

You can assign objects and actors to any number of states. To do this, assign a name and add the state to the element.

How to proceed

To add a state:

» Lock the diagram.

» Select the Element which you want to add a state to and lock it as well.

» Select `Edit>Properties...`.
The dialog box of the same name appears.

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» Select the tab State.
All states which are already assigned to the current Element are listed. All states which were provided for the element during the configuration are listed in the drop-down list Name.

» Enter the name of the new state in the field in the field Name.
The [Add] button is activated.

» To transfer the new state in the list, click on [Add].

» Finally, close the dialog box with [OK].
The state is added to the element.

Modifying a State

You can modify each state of an element. This can also be done for pre-configured states. However, the modifications only apply for the element's current reference.

How to proceed

To modify a state:

» Lock the diagram.

» Select the Element whose states you want to modify and lock it as well.

» Select Edit>Properties....
The dialog box of the same name appears.

» Select the tab State.
All states which are already assigned to the current Element are listed.

» Select the state that you want to modify.

» Make the modifications you want to in field Name and click on [Modify].

» Finally, close the dialog box with [OK].

Removing a State's Assignment

You can remove a state from the list of assigned states. This refers to a state which you added to the element yourself (i.e. not a pre-configured one). Once done, it will no longer be available in the drop-down list Name.

How to proceed

To delete a state:

» Lock the diagram.

» Select the Element whose states you want to remove and lock it as well.

» Select Edit>Properties....
The dialog box of the same name appears.

» Select the tab State.
All states which are already assigned to the current Element are listed.

» Select the state that you want to remove from the assignment.
» Click on [Remove].
» Finally, close the dialog box with [OK].

D-2.3 Modifying the Display of Elements

Objects and activities are normally shown by a square and actors by a simple stick man in diagrams of the dynamic model (diagrams of use case, sequence, collaboration and activity diagram types).

You can set various options for representing Elements. A distinction is made between those settings which apply to all Element in a diagram and those which carry out for an individual Element (see page D-60).

In addition, various settings for labeling can be made for all Elements in the diagram (see page D-58).

Read how to show and hide attributes for individual Elements in chapter D-2.2.2, "Showing an Attribute", page D-53.

D-2.3.1 Information about Displaying the Diagram Yourself

In the diagram's info box, you can only display or hide various information.

How to proceed

To specify the labeling of a diagram:

» Lock the diagram.
» Click on a free point in the diagram and select Edit>Properties....
The dialog box of the same name appears.
» Select the tab Display.
» Select the diagram entry in the drop-down list Element.
» To be able to see the diagram's package path in the info box, activate the check box Paket anzeigen.
» To be able to see the diagram's stereotype value, activate the check box Show stereotype.
» To be able to see the symbol stored for the element type's stereotype, activate the check box Show icon.
» Activate the check box Typ anzeigen to be able to see which configured type the diagram is from.

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» Finally, close the dialog box with [OK].
The labeling of the diagram is adapted accordingly.

D-2.3.2 Modifying Elements' Labeling

You can set which components should make up an Element's labeling. You can set this for each element type for the entire diagram. Depending on the element type, various components are offered. You can control the following components:

- Names of the Element
- Package–if necessary, restricted to external packages
- Stereotype value
- Stereotype icon
- Class, to which the Element is assigned
- Class package–if necessary, restricted to external packages
- State of objects and actors
- Parameter of messages

Read how to modify the position of a label in page D-61.

How to proceed

To specify the labeling of an element type:

» Lock the diagram.

» Click on a free point in the diagram and select Edit>Properties....
The dialog box of the same name appears.

» Select the tab Display.

» Select the entry of the element type whose labeling you want to change in the drop-down list Element.
The relevant check boxes are offered in the dialog box for the respective labeling components.

How to proceed

To show the element's names:

» Activate the check box Name anzeigen in the group box Name display.
You can only view an Element's package if you have also displayed the names

» To be able to see the Element's package, activate the check box `Show packages`.
  You can limit the package display to packages which are not the current diagram's package.
» To be able to limit the package display, activate the check box `Show foreign packages only`.
» Confirm the element type information with `[Apply]` and then, if necessary, select the next element type in the drop-down list `Element`.

How to proceed

To show an Element's stereotype:

» Activate the check box `Show stereotype`.
  If a symbol is also stored for the element type's stereotype, you can also display this symbol.
» Activate the check box `Show icon`.
» Confirm the element type information with `[Apply]` and then, if necessary, select the next element type in the drop-down list `Element`.

How to proceed

Objects, activities and actors are assigned to a class. To display this class in the labeling:

» Select the element type entry in the drop-down list `Element`.
  The group box `Class display` is displayed.
» To be able to see the class' names, activate the check box `Show class`.
» To be able to see the class' package, activate the check box `Show packages` in the group box `Class display`.
  You can limit the class' package display to packages which are not the current diagram's package.
» To be able to limit the package display to external packages, activate the check box `Show foreign packages only` in the group box `Class display`.
» Confirm the element type information with `[Apply]` and then, if necessary, select the next element type in the drop-down list `Element`.

How to proceed

Objects and actors can contain states. To display these states in the labeling:

» Select the element type entry in the drop-down list `Element`.
» Activate the check box `Show state`.

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» Confirm the element type information with [Apply] and then, if necessary, select the next element type in the drop-down list Element.

» Finally, close the dialog box with [OK].
The labeling of the element types is adapted accordingly.

D-2.3.3 Modifying Icons for a Diagram's Objects, Activities and Actors

You can set which of the three following depictions should be used for all of a diagram's objects, activities and actors:

Display of Icons in Objects, Activities and Actors

The icon which is represented in the second and third case is either the icon of the assigned class or an icon you selected yourself.

Modifying the Display Type

For all of an element type's Elements, you can determine within a diagram whether they should be displayed

- in the standard display
- in the standard display with icon or
- only as an icon.

Which should be displayed.

Read how to assign as many icons as required for individual Elements in section "Assigning as Many Icons as Required", page D-61.

How to proceed

To set the display type for all of an element type's Elements:

» Lock the diagram.

» Click on a free point in the diagram and select Edit>Properties....
The dialog box of the same name appears.

» Select the tab Display.

» Select the desired element type entry in the drop-down list Element.

» To display the Elements as

- standard (rectangle), deactivate the check boxes Show icon and Icon only

- standard with the stereotype icon, activate the check box `Show icon` and deactivate the check box `Icon only`
- stereotype icon only, activate the check boxes `Show icon` and `Icon only`

» Close the dialog box with `[OK]`.
All Elements of the selected element type in the diagram are displayed accordingly.

Setting the Labeling Position of Elements

After you have specified that only one icon should be displayed for your diagram's Elements, you can set where their labeling (name, packages stereotype value) should be displayed on the icon for each individual Element.

How to proceed

To set the labeling position:

» Lock the diagram.
» Select the Element which you want to set the position for its labeling and select `Edit>Properties...`.
The dialog box of the same name appears.
» Select the tab `Icon Display`.
» Using the junctions in the group box `Text alignment when icon only`, enter the position of the labeling and close the dialog box with `[OK]`.
The labeling of the selected model element is positioned accordingly.

Assigning as Many Icons as Required

Elements in the diagrams of dynamic models usually have the same icon which its assigned class also has. However, they can display as many other icons as required in each individual Element.

How to proceed

To use another icon:

» Lock the diagram.
» Select the Element whose icon you want to modify and lock it as well.
» Select `Edit>Properties...`.
The dialog box of the same name appears.
» Select the tab `Icon`.
The file of the current icon is shown in the drop-down list `Icon`.
» Select the required file from the drop-down list `Icon`. If necessary, use a text sample to limit the entries
or

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» Click on [Select].

The Select Icon dialog box appears. All bitmap files are shown which are stored in the $INODIR/icons/default directory.

» If necessary, look through the icons using the path buttons. Select the required icon and close the dialog box with [OK].

Both the file name and the icon are displayed.

» Close the dialog box with [OK].

The Element is displayed with the new icon.

Read how to modify the position of a label in the Icon only setting in page D-61.

D-3 Covering Resources, Setting Structures (Object Diagram)

Whatever your aims might be during business process modeling–whether

- Documenting Existing Structures and Flows
- Verifying flow optimization
- Planning completely new structures

–in every case it is necessary to obtain the available or necessary resources and place them in relationship to each other. The Innovator Business edition edition provides the object diagram for this purpose.

Use of Object Diagrams

A common use for object diagrams are **organization charts**; these represent the organizational structure of your company in organizational units (such as divisions, departments and positions). There are also, however, other conceivable applications for this diagram type, e.g.

- **IT infrastructure diagram**: You can represent the machinery, computer configuration or network architecture in your company here.
- **Target diagram**: you can identify the main goals of your company and break these down into sub-goals.
- **Task structure tree**: you can identify tasks which occur in your company and refine these as much as possible.
- **Task assignment diagram**: you can graphically display responsibilities for certain tasks.
- **Knowledge map**: includes available or necessary expertise essential for completing tasks within your company.

Why Object Diagrams?

UML assigns the so-called static diagrams to the object diagram, i.e. structure specification remains largely unaltered.

Note

Object diagrams are often described as snapshots of classes in software development. You can examine objects as tangible instances of classes at a defined point in time.

In business process modeling on the other hand, the object diagram looks more like a visualization of structures which are independent from modeled processes.

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Please remember: an object is the specification of an object or a concept from the real world (see page D-10); class is an umbrella term for all objects which have the same properties (see page D-12).

Therefore, if e.g. the `computer`, `employee` and `office tasks` classes exist for your current model, you can easily create the objects

- `PC Gandalf` in the `Computer` class
  (PC Gandalf:computer)
- `John Smith` in the `employee` class
  (John Smith:employee)
- `Write letter` in the `office tasks class`
  (Write letter:office tasks)

from them. In the object diagram, you can graphically display the fact that Mr. John Smith who works at the computer called Gandalf is responsible for writing letters.

Note **In the object diagram, you do not specify how Mr. Smith proceeds when writing a letter. Dynamic diagrams (here: activity diagrams) are provided for this purpose.**

It might be a good idea to model structures from activities in particular cases in a business process model, e.g. if tasks which already exist have been split up, which serve as mandatory specifications for activity hierarchy. However, if the long-term modeling goal of a process is flow reorganization, static relationships should not be included in modeling between activities in the object diagram.

Elements of Object Diagrams

You can use the following elements in the object diagram:

- Objects (see page D-65)
- Activities (see page D-65)
- Actors (see page D-65)
- Relationships (see page D-71)

D-3.1 Creating and Changing Object Diagrams

Object diagrams specify process-invariant relationships of objects, activities or actors, which always need to have a type in business process modeling, e.g. a class in the configuration model.

Unlike diagrams of dynamic models, object diagrams are not assigned elements. Simply select the package which you want to create the object diagram in.

Prerequisites

To be able to create an object diagram–whatever your objective–the following things need to be provided in your model's configuration:

- Object diagram creation is enabled (see page D-186).
- The desired classes are provided in the `Insert` menu (see page D-193).
- Object diagrams are permissible in the package in which you want to create the object diagram (see chapter A-3.4.1, "Setting Permissible Elements", page A-60).

Other Information

- chapter B-2.2.2, "Creating and Opening Diagrams", page B-34
- chapter B-4, "Working in Diagrams or Tables", page B-99
- section "Renaming Elements–General", page B-50
- chapter D-2.3.1, "Information about Displaying the Diagram Yourself", page D-57

D-3.2 Working with Objects

Regardless of which goal you use the object diagram for, whether as an organization chart, an infrastructure or a knowledge map, you always only implement objects and their relationships, as well as activities and actors in individual cases.

As activities and actors are normally an exception in object diagrams, we will always speak of objects over the following pages. The conclusions and procedures apply for activities and actors.

D-3.2.1 Procedure

When working in the object diagram, you normally proceed in the following order:

- Insert new objects in the desired classes or make other existences of visible objects which already exist (see chapter D-2.1.1, "Creating Objects, Activities and Actors", page D-38).
- If applicable, name objects and decide whether the existing references should be affected by the change (see section "Renaming an Element's Reference", page D-45).
- If you set that an object should be from another class, assign it another class (see chapter D-2.1.3, "Determining an Element's Class (Configured Type).", page D-46).

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- Which attributes an object can have as standard and whether this attribute list can be extended if required are set in the configuration of classes for objects. This means that you can add new attributes for each object. You can also assign current values to the various attributes in the object diagram if required. You can show and hide the attribute list as and when required (see chapter D-2.2, "Working with Attributes and States", page D-50).
- You can nest objects within each other and, in doing so, e.g. display which task an employee is responsible for etc. (see chapter D-3.2.2, "Nesting Objects", page D-66).
- When using a diagram in your company, it can be important that certain aspects are highlighted and others optically canceled. To do this, use various means of visualization, implement e.g. icons or certain fonts etc. (see chapter D-3.2.3, "Modifying how Objects are Displayed", page D-68).

Other Information

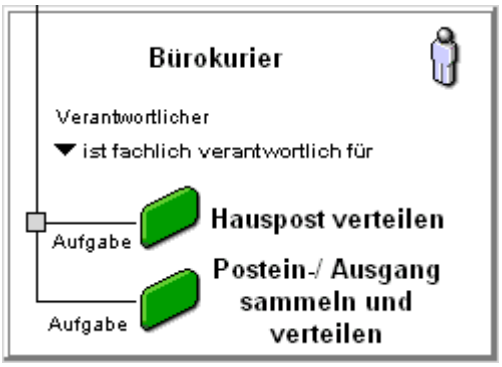
- chapter D-3.3, "Modeling Static Relationships", page D-71
- chapter D-2.1.2, "Renaming an Element", page D-42
- chapter D-2.1.4, "Specifying an Object's or an Actor's Properties", page D-49
- chapter B-2.3.2, "Moving Elements in Another Package", page B-53
- chapter B-2.5, "Removing and Deleting Elements", page B-61
- chapter B-4, "Working in Diagrams or Tables", page B-99

D-3.2.2 Nesting Objects

You can–unlike in other diagrams in the Innovator Business edition edition–nest objects within one another in the object diagram. This means that you can graphically emphasize if an object has a particularly close relationship to one or various other objects.

Example

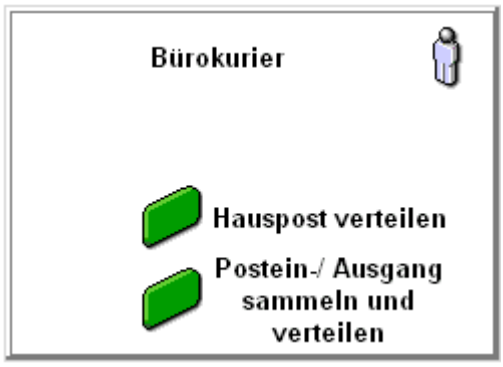
You want to display which positions are responsible for which tasks in a task assignment diagram. Each position is an object in the `position` class, each individual task is an object in the `tasks` class.



Nested Objects in a Locked Diagram

Note

Nesting objects does not affect relationships between objects; it only graphically visualizes relationships. You can also hide the relationships within one of these object containers in locked diagrams if you think that the relationship can be sufficiently visualized.



Nested Objects in an Unlocked Diagram

How to proceed

To be able to nest objects within each other, the higher-level object needs to be displayed as a container:

» Lock the diagram.

» If applicable, create the object which should contain other objects. Otherwise, select and lock it as well.

» Select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Objektanzeige`.

» Activate the check box `Container` and close the dialog box with `[OK]`.
The object is displayed as a frame.

» To enlarge the frame, move the mouse pointer over one of the corners. Once the pointer becomes a double arrow, pull the frame to the desired size keeping the mouse button pressed.

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D-3.2.3 Modifying how Objects are Displayed

In dynamic diagrams, once you have set how all elements of a class are displayed in the diagram you can partially deal with each object individually in the object diagram. Don't make settings as you usually would for the diagram, but for the individual object instead.

Settings for all Elements of a Class

Make the following changes for all a diagram's objects:

- Name display (with or without a package path)
- Class display (with or without a package path)
- Shortname display (only worthwhile if you have given each object an identifiable shortname)

Read about this in chapter D-2.3.2, "Modifying Elements' Labeling", page D-58

Also set whether the relationship names and/or the role names should be displayed for all relationships in the diagram (see page D-61).

Settings for Individual Objects

In contrast, individually set the following settings for each object:

- How the icons of assigned classes are displayed (see page D-70) or
- Any number of icons instead of icons of assigned classes (see page D-69)
- Position of a label if the object is only displayed as an icon (see page D-61)
- Font for object and class labels (see page D-70)

Other Information

- chapter D-2.3.1, "Information about Displaying the Diagram Yourself", page D-57
- chapter D-2.2, "Working with Attributes and States", page D-50
- chapter D-3.3.2, "Changing Relationship Properties", page D-74

Changing an Object's Icon

You can set which of the following three displays should be displayed for each individual object:

The icon which is represented in the second and third case is set using the class which the object was assigned to as standard.

- If a special icon is displayed for the class, this icon is also preset for the assigned objects.

- If there is no special icon for this class, the stereotype icon is used (see chapter A-4.1.2, "Creating, Modifying and Deleting Property Values", page A-78).
- If a stereotype icon is also not defined for the class, a white field appears.

You can use as many other icons as required instead of an icon of a class.

Displaying a Class' Icon

You can set whether the icon of the assigned class should by displayed in an object.

Note

The check boxes `Container` and `Icon only` cancel each other out.

How to proceed

To display an object as a standard display, standard display with an icon or only as an icon:

» Lock the diagram.
» Select the object which contains the icon you want to change and lock it as well.
» Select `Edit>Properties...`.
The dialog box of the same name appears.
» Select the tab `Objektanzeige`.
» To display the object as
- Standard (rectangle), **de**activate the check boxes `Show icon` and `Icon only`
- Standard with an icon, activate the check box `Show icon` and **de**activate the check box `Icon only`.
- An icon only, activate the check boxes `Show icon` and `Icon only`.

» Close the dialog box with `[OK]`.
The object is displayed accordingly.
Read how to modify the position of a label in the `Icon only` setting in page D-61.

Using Another Icon

Instead of using the stereotype icon, you can use another icon from the `$INODIR/icons/default` directory.

How to proceed

To use another icon:

» Lock the diagram.
» Select the object which contains the icon you want to change and lock it as well.

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» Select Edit>Properties....
The dialog box of the same name appears.

» Select the tab Icon.
The file of the current icon is shown in the drop-down list Icon.

» Select the required file from the drop-down list Icon. If necessary, use a text sample to limit the entries

or

» Click on [Select].
The dialog box Symbol auswählen appears. All bitmaps are shown which are stored in the $INODIR/icons/default directory.

» If necessary, look through the bitmaps using the path buttons. Select the required bitmap and close the dialog box with [OK].
Both the file name and the bitmap are displayed.

» Close the dialog box with [OK].
The object is displayed with the new icon.
Read how to modify the position of a label in the Icon only setting in page D-61.

Switching Back to the Class' Icon

If you have used any other icon other than the icon of the assigned class, as described above, you can switch back to the class' icon again.

How to proceed

To use the class' icon:

» Lock the diagram.

» Select the object which contains the icon you want to change and lock it as well.

» Select Edit>Properties....
The dialog box of the same name appears.

» Select the tab Icon.
The file of the current icon is shown in the drop-down list Icon.

» Click on [Default].
The class' icon is set again.

» Close the dialog box with [OK].
The object is displayed with the class' icon.

Changing Fonts

You can change fonts within an object. You can influence the following fonts:

- Object name
- Shortname
- Class name
- Each attribute individually

How to proceed

To change the font:

» Lock the diagram.
» Select the object whose font you want to change and select `Edit> Properties...`.
  The dialog box of the same name appears.
» Select the tab `Fonts`.
  All of an object's fonts which you can change are listed in the list box `Attribute value`. All available fonts are listed in the list box `Font list`.
» Select the font you want to change in the list box `Attribute value`.
  The entry of the current setting is marked in the list box `Font list`.
» Select the desired font and click on `[Apply]`.
» Repeat these steps for all fonts which you want to change.
» Finally, close the dialog box with `[OK]`.

How to proceed

To return to the original font:

» Open the tab `Fonts` in the dialog box `Edit/Properties`, as described above, and click on `[Default]`.
» Close the dialog box with `[OK]`.

D-3.3 Modeling Static Relationships

Relationships between objects, activities and actors which you use in the object diagram are modeled process-invariant relationships.

Relationships between elements should already be predefined as associations or aggregations in the configuration model. If this is the case, precisely these relationships are given as a suggestion in the object diagram. However, you can overwrite these suggestions or select another one from other suggestions.

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Properties of a Relationship

The following will describe in brief the properties of a relationship and how it relates to the corresponding associations and aggregations between classes in the configuration model:

- **Name with reading order**

Relationships should always have a name to enable better switching between various relationships in dialog boxes. You should also enter which direction the name should be read in. The reading order of relationships is displayed as an optional extra. Associations need to contain the corresponding properties in the configuration model.

- **Element roles**

Each element in a relationship also has a role. If no role was explicitly given to an element's class in the configuration model, the role is taken from the name of the class.

- **Hierarchy property**

If an element is made up of other elements or can be viewed as a unit, an aggregation is offered as a means of modeling.

- **Direction**

The graphic direction of the relationship actually goes back to the navigability of the roles in the relationship in the configuration model. However, as navigability is more targeted towards technical interpretation, only the graphic direction is set in business process modeling object diagrams.

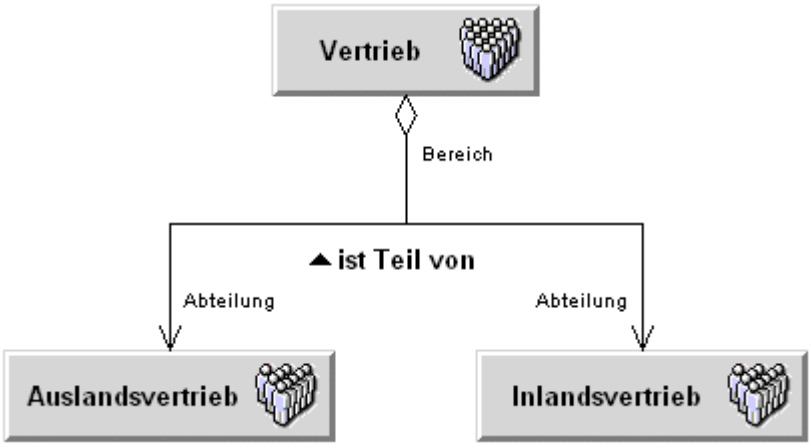
If navigability of relationships is semantically relevant in your configuration model, the relevant relationship direction in object diagrams is interesting as a filtering criteria when maintaining how relationships are displayed to an element.

Example

A `division` class and a `department` class exist in the model configuration. Both classes are linked in a class diagram by a relationship (i.e. aggregation) called `is part of`.

Now create an object of the `division` class called `sales` and two objects of the `department` class called `domestic sales` and `foreign sales` in the object diagram.

Lastly, create a relationship between the object `sales` and both of the departments. Innovator now searches in the class model for the classes concerned and verifies which relationships are permissible. If there is only precisely one permissible relationship, this is automatically adopted in the object diagram.



Hierarchical Relationship `is part of` *with all of the Previously Described Properties*

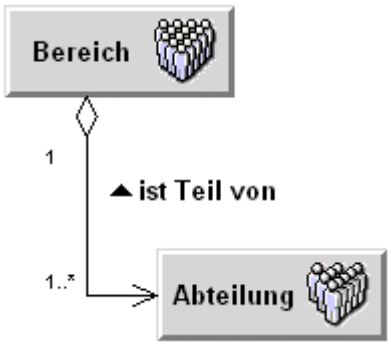
The relationship can be read from bottom to top or from the subordinate element to the higher-level element (which can be identified as the rhombus).

Frequency of Relationships

The number of objects of a class which can exist in a model is not set. However, the role of the relationship in the model's configuration can predefine how many relationships one instance can or should have to other instances in this role. Setting the frequency of relationships is identified as **multiplicity**.

Example

The configuration sets that a department is always part of precisely one division, whilst one division contains at least one department.



Example: Multiplicities in an Aggregation's Roles in the Configuration Model

You can now create as many objects of the `head of department` class as required in the object diagram. However, if you want to assign more than one departmental head to a department, subsequent verification produces an inconsistency message.

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D-3.3.1 Creating Relationships

Any number of objects can be involved in a relationship.

Relationships can have a name. Roles of the objects concerned are entered at the ends of the relationship (association ends). You can also make the direction of the relationship clear using arrow points.

The diagram must be locked during all of the following tasks.

How to proceed

To create a relationship:

» Select the objects which you want to create a relationship between.

» Select `Insert>Relationship>New`.
The relationship is created. If at least one relationship which can be instantiated exists between the object's classes, one of the relationships is selected as an example for the new relationship. Their essential properties, such as name, roles etc., are adopted in the new relationship between the objects.

D-3.3.2 Changing Relationship Properties

If you want to change the relationship between objects, it is normally not sufficient to merely change the name of the relationship.

A relationship has other properties as well as a name, such as roles, reading order, hierarchy properties and directions. These also need to be taken into consideration when making changes. If the relationship which you want to use instead of the existing relationship is already defined in the configuration model, only a few steps need to be made to make the change.

Alongside the changes made to the relationship itself, element properties of the relationship set what is particularly relevant for mapping in other Innovator editions (see page D-23).

You can change the graphic format of the relationship being displayed with regard to the type and width of the line.

The following changes are therefore possible:

- Change the name of the relationship; this normally results in changing the other properties as well.
- Change the element properties
- Change the format, i.e. how the relationship is displayed in the diagram

Changing Relationships

You can assign names to relationships between objects in the object diagram. As this normally results in changing the other properties as well, the new relationship's other properties also need to be adopted.

How to proceed

To change the relationship:

» Select the relationship and select Edit>Properties....
The dialog box of the same name appears. All relationships which are permissible between the respective classes are listed in the drop-down list Name in the tab Name.
You can also enter a name rather than selecting it.

» Select a name from the drop-down list Name and click on the [Default] button so that the relationship's other properties are also adopted in the dialog box.

» Close the dialog box with [OK].
The changed relationship's properties are shown in the diagram.

Showing and Hiding Relationship Names and Role Names

For all relationships in the object diagram, you can set whether their relationships (such as names and roles) are displayed.

How to proceed

To show/hide a relationship's properties:

» Lock the diagram.

» Click on a free point in the diagram and select Edit>Properties....
The dialog box of the same name appears.

» Select the tab Display. Select the Relationship entry in the drop-down list Element.
Show or hide the appropriate properties using the check boxes.

Activate the desired check boxes and close the dialog box with [OK].

Changing Line Formats

You can change the line format of the relationship's line being displayed. The following can be distinguished between

- Line style
  - Solid
  - Dashed
  - Dotted
- Line width
  - Standard
  - Emphasized

You can individually set these display types for both the entire relationship and for individual relationship ends.

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How to proceed

To change a relationship's line format:

» Lock the diagram.

» Select the relationship and select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Format`.

» Activate the radio button whose line type you want to assign in the group box `Line style`.

» Activate the radio button whose line width you want to assign in the group box `Line width`.

» Close the dialog box with `[OK]`.
The relationship's line format is displayed according to your settings.

D-3.3.3 Automatically Displaying an Object's Relationships

You can use the maintenance status of a reference to an object, activity or actor so that Innovator automatically visualizes the element's relevant relationships in the reference.

The maintenance status always refers to an element's existence in the current diagram. This means that an element can have different maintenance states in various diagrams.

Multiple existences of elements are permissible in object diagrams; they do, however, override automatic maintenance of relationship displays. The reason for this is the assumption that the modeler wants to display an element's various existences in its own respective context.

The following maintenance settings are distinguished between:

- `User defined`
  Explicitly set which of an element's relationships are displayed in the diagram - automatic maintenance, therefore, does not occur.
- `Local in diagram`
  All an element's relationships to elements of other nodes are displayed in the current diagram.
- `Complete model`
  All relationships which are involved with the element are displayed. If you switch to this type of maintenance, other elements involved in the diagram may also be automatically included in these relationships. The newly-added elements always contain the maintenance status `Local in diagram`.
  If one of the elements cannot be included in the diagram because the element's type is not permissible for the current diagram, all permissible elements are initially added and then the maintenance status is set to `Local in diagram`.

You can also filter the relevant relationships using their direction. You can therefore e.g. only automatically show the relationships to the element which "point" to the element.

How to proceed

To change the relationship display's maintenance to a set of objects, activities and actors:

» Lock the diagram.

» Select a set of objects, activities and actors and select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the `tab Maintenance`.

» Activate the radio button for the desired maintenance state in the `group box Mode`.

» If you want automatic maintenance rather than user-defined maintenance, use a filter for the relationships to be displayed in the group box `Direction of displayed relationships`.

» Close the dialog box with `[OK]`.
The relationships of the marked object are displayed according to their maintenance settings.

The maintenance status from all classes concerned with a relationship are evaluated. This means that a relationship is also displayed in the diagram if e.g. one of the elements concerned with the relationship has the status `User defined` and the other element has the status `Complete model`.

If a diagram-local node which is maintained is linked with a node with user-defined maintenance, all existing relationships between them are displayed. If one of these relationships is removed from the picture, the first node changes from the `Local in diagram` status to the `User defined` status.

Relationships can automatically occur in the diagram during the following actions for diagram-local and global maintenance:

- If an element is added to the diagram, relationships probably already exist in other diagrams between this one and one of the nodes displayed in the current diagram. The relationships are adopted in the diagram if the available node has diagram-local maintenance or the added node has diagram-local or global maintenance.
- If another diagram contains two elements which are also displayed in the current diagram and if a relationship is created there between both of these nodes, this relationship is also displayed in the current diagram if one of the two nodes is diagram-locally or globally maintained.

Other Information

- chapter B-2.1.3, "Displaying Relationships to Model Elements from Other Diagrams (Maintenance Status)", page B-24

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D-4 Editing Process Models

You can use a process model to examine your company's flow organization, i.e. which order which tasks should be carried out in, which people or devices are involved in this, as well as which products and/or services or objects result from these.

Depending on which aspects you want to emphasize, use the diagram type best suited:

- **General aims or services**: Use the business use case diagram for this (see chapter D-4.1, "Realizing Requirements with the Use Case Diagram", page D-80)
- **Order of tasks**: Use the activity diagram to set which activities should be carried out when, which should run alongside and which people should be involved in them (see chapter D-5, "Specifying Activities in the Process Model (Activity Diagram)", page D-115).
- **Flow of communication**: Use the sequence diagram if you want to examine who communicates with whom when for a flow (see chapter D-4.2, "Displaying Time Flow of Communication (Sequence Diagram)", page D-90).
- **Structure of communication**: It can be helpful in some cases to structurally display flows. To do this, use a collaboration diagram (see chapter D-4.3, "Displaying Structural Organization of Objects (Collaboration Diagram)", page D-104).

Which order you should use the diagrams in is only a guideline and is not obligatory. However, it is a good idea to start with the business use case diagram. You obviously also don't need to use all the diagram types.

Note

The following chapter addresses diagram types.

- **Business use case diagram**
- **Sequence diagram**
- **Collaboration diagram**

The activity diagram, which is the central diagram in business process modeling, is described in a chapter of its own in greater detail.

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D-4.1 Realizing Requirements with the Use Case Diagram

A business use case diagram shows the view of the company or parts of it from the outside: The benefits persons or other elements gain from the **services** offered by the company. Therefore, the business case diagram does not examine how the flows are structured within the company (yet).

The business use case diagram normally displays the first step in the requirement analysis. The terminology used here should match the specialized terminology of the final user. This also simplifies communication with your customers and departments.

You can use the following elements in a business use case diagram:

Actor An actor is a role that acts on part of the system from outside (see page D-81). This role is normally assumed by a person, but often by a technical object as well. A person or a technical object can hold various roles.

Use Case A business use case is a self-contained sequence of work steps within a system. It is initiated by an actor and he is then communicated with using one of the following messages (see page D-81).

System A system combines several business use cases. It displays the border between the business use cases and the environment. It specifies the scope of the modeled area (see page D-83). In the business use case diagram, a system is represented by a rectangle. The actors, who/which interact with the system, are located outside this rectangle, while the business use cases, which represent the possible interactions, are contained within the rectangle.

A system is a package in Innovator. The business use cases which you want to display within a system need to be in the appropriate package.

You can use various systems in business use case diagrams at the same time; this enables e.g. clear structure of subsystems.

Relationships A relationship (see page D-84) between an actor and a business use case describes the participation of an actor in a business use case.

A relationship between two actors describes an inheritance relationship. One actor inherits from another if the role of the other generalizes its own.

A relationship between two business use casess represents extensions, inheritances or differences in content.

Note

You can only create business use case diagrams if templates for this element type have been stored in the model by the administrator. Read about this in chapter A-4.3.5, "Creating and Changing Diagram Templates", page A-99.

Other Information

- chapter B-2.2.2, "Creating and Opening Diagrams", page B-34
- chapter B-2.3.1, "Changing Names, Relationships and Declarations", page B-49
- chapter B-4, "Working in Diagrams or Tables", page B-99
- chapter D-2.3.1, "Information about Displaying the Diagram Yourself", page D-57

D-4.1.1 Creating Actors, Use Cases and Systems

You initially create one or more model elements (actor, business use case, system) in a business use case diagram and then make relationships between them (see chapter D-4.1.2, page D-84). There is no order when creating model elements.

Creating Actors

Actors can only be created in a business use case diagram, and not in the model browser.

Note

The administrator needs to have stored (at least) one class for actors (from «actor» stereotype) to be able to create an actor (see page D-187). All classes from the actors are then displayed as a submenu in the `Insert>Actor` menu.

Technically speaking, you create a new object of a class with each new actor. The appropriate chapter will then be referred to–e.g. when renaming a chapter– instead e.g. chapter D-2.1.2, "Renaming an Element", page D-42.

In chapter D-2.1.1, "Creating Objects, Activities and Actors", page D-38, read how to

- Create a new actor of a certain class

  or

- Make an actor which already exists visible again

Note

You can also assign another class to an actor at a later date (see page D-46).

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The new actor is stored in the business use case diagram's package or–if it is configured–in the package which was preset for actors (see chapter A-3.4.4, "Redirecting Elements once Created in a Certain Package", page A-68).

Other Information

- chapter D-2.1, "Creating and Modifying Objects, Activities and Actors", page D-38
- chapter B-2.3.2, "Moving Elements in Another Package", page B-53
- chapter B-2.5, "Removing and Deleting Elements", page B-61
- chapter D-2.3, "Modifying the Display of Elements", page D-57

Creating Use Cases

The administrator needs to have stored (at least) one template for business use cases to be able to create a business use case (see chapter A-4.3.2, "Creating Packages for Model Elements and Packages", page A-91). The business use case also needs to be defined as a permissible element type in the current package.

Create a new business use case or make a business use case which already exists visible in the diagram. You can only create new business use cases in the model browser.

Note

A business use case can be depicted in as many business use case diagrams as necessary, however, a business use case can only be depicted once within a business use case diagram.

This means that you can achieve the corresponding command in the model browser or use case diagram:

- All templates for business use cases can be found in the `Element>New>Use Case` menu in the model browser. You can also create use cases as new.
- In the business use case diagram, the `Insert>Use Case><Diagram Template>` menu contains templates which contain a menu item `Add Existing` which is used as a switch for the corresponding behavior of the menu item `Insert`. The `Add Existing` menu item switches between creating a new use case and inserting a use case which already exists. Activation is shown in the toolbar on the left-hand side.

How to proceed

To create a business use case from the model browser (so that it will be visible in a business use case diagram later):

» Jump to the model browser and select the package where the business use case should be stored in the model tree.

» Select the template in the `Element>New>Use Case` menu which you want to create a business use case from.

  The new business use case is shown in the list of model elements. It has a default name which was specified in the template.

» To rename the business use case, select it and select `Element>Properties...`.

  The dialog box of the same name appears.

» Change the name as desired in the field `Name` and close the dialog box with `[OK]`.

Even though use cases are organized in a different way to other elements in the Innovator Business edition, you use them in a similar way in the diagram. To create a business use case from the diagram, proceed precisely as described in section "Creating a New Element ", page D-40 or section "Creating Further Existences of an Element", page D-41,

Other Information

- chapter B-2.3, "Changing Name and Packages of Elements", page B-49
- chapter B-2.5, "Removing and Deleting Elements", page B-61
- chapter D-2.3, "Modifying the Display of Elements", page D-57

Creating Systems

You can only create a system in the business use case diagram.

The system which you depict in the business use case diagram is a package in Innovator, i.e. a basket for elements. You will normally use the package here for storing the current diagram's business use cases.

At least one package needs to exist in the model which has the business use cases stereotype defined as permissible elements for to be able to create a system (see chapter A-3.4.1, page A-60). All packages which correspond to this prerequisite are then offered in the `Insert>System...` menu.

Read about packages in chapter A-3, "Structuring Models with Packages", page A-35.

Using Systems

If you create a system in the business use case diagram it is initially shown as a small rectangle. For desired depiction it should be a larger box which contains various business use cases.

How to proceed

To be able to use the rectangle as a system:

» Enlarge the rectangle so that all business use cases which you want to assign to the system fit in.

  The system is–unlike with e.g. business use cases–not a filled shape. You can enter where further elements should be positioned within the rectangle. All elements which are within the system frame are assigned to the system.

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» Now create all business use cases which you want to assign to the system. Make sure you set their position within the system.

» If business use cases are already outside of the system and you want to bring them in at a later stage, simply move the elements within the system's frames. Enlarge the system if necessary.

» To move the system and all the elements within it, move the mouse pointer close to the frame within the system until it becomes a double arrow. Now move the system to the desired place.

D-4.1.2 Creating Relationships Between Model Elements

Relationships from model element are displayed by lines or arrows. You can depict a business use case's relationship to a system by the business use case's position.

You can depict relationships between the following element types:

- Actor and business use case (association) (see page D-84)
- Actor and actor (generalization) (see page D-85)
- Use case and business use case (dependency or generalization) (see page D-85)
- Use case and system: Use cases are positioned within a system box. This depicts them as part of the system.

No relationships between actors or business use cases can be displayed in the model browser. You can also identify which business use cases are positioned in which system in the model browser.

How to proceed

The diagram must be locked during all of the following tasks:

» Lock the business use case diagram.

Creating Relationships Between Actors and Use Cases

The actor has a relationship–not initially specified–to the business use case. This association is depicted by a line between the actor and business use case.

Note

The UML doesn't say which type a relationship between actor and business use case is from. However, it is conventional for actors which initiate a business use case to be displayed to the left of the business use cases. Whereas, actors which are affected in any way by a business use case are depicted to the right of the business use cases.

You can create relationships between actors and business use cases (associations) individually for each actor. However, in one step you can

- Create various relationships to business use cases for an actor. In this case, the actor needs to be selected first.
- Create various relationships to various actors for a business use case. In this case, the business use case needs to be selected first.

At least one relationship template for associations needs to exist in the model to be able to create an association (see page A-93).

How to proceed

A relationship between an actor and a business use case can only exist once. However, an actor can be linked with any number of various business use cases.

» Select the actor which you want to link to one or more business use cases or select the business use case you want to link to one or more actors.
» Then select one or more business use cases or actors. Ensure that none of the business use cases are already linked with the selected actor.
» Select `Insert>Association><Relationship Template>`.
The actor is linked to the selected business use cases by lines.

Creating Relationships Between Actors

This relationship always displays an inheritance between a general actor (parent) and a special actor (son) The inheritance is depicted by an arrow from the son to the parent. The parent relays all information to the son.

Inheritances are only possible between various actors. As actors can appear graphically more than once in a use case diagram, you need to ensure that the selected actors have different names.

The order in which you select the actors determines who inherits from whom: The parent is selected first, the son/s is/are the secondary selection.

At least one relationship template for generalizations needs to exist in the model to be able to create an inheritance (generalization) (see page A-93).

How to proceed

To create an inheritance relationship between actors:

» Select the actor which should be the parent.
» Then select the actor/s which should be the son/s.
» Ensure that the model elements selected have different names.
» Select `Insert>Generalization><Relationship Template>`.
An arrow from the sons to the parent are created respectively.

Creating Relationships Between Use Cases

Use cases can have relationships to other business use cases: Dependencies or generalizations (inheritances). Can and must relationships are distinguished between for dependencies.

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The type of relationship is displayed according to its stereotype, e.g.:

- **Extend:** Subtasks from various business use cases can be used according to UML. They broaden the functions associated with business use cases. The relationship is then tagged as extend. It is depicted as a path from the extended business use case to the business use case which is extended by the subtasks. Extend identifies a can relationship. A business use case can be extended by various business use cases. You can define extension points in the extended business use case and, in doing so, display which special case an extension should take place in.
- **Include:** Subtasks which are fixed components of various business use cases; they are linked with these by the include relationship. It is depicted as a path from the business use case which uses the subtasks to the business use case which contains the subtasks. Include identifies a must relationship. The include relationship specifies that a business use case uses another in its flow. This relationship is often made up of combined sequences in various business use cases to a single business use case.
- **Generalization:** use cases can inherit from each other. The son contains all of the parent use case's tasks and can also contain other tasks (specialization).

If you create a **dependency** between business use cases (e.g. include or extend), make the following specifications:

- The direction of the dependency is set by the order in which the model elements concerned are selected.
- You can set the type of dependency using the «extend» or «include» stereotype.

Note **Dependencies between business use cases are shown by arrows. You cannot reverse the direction of the arrow at a later time. Read how to join other model elements to the relationship in section "Linking Segments", page B-44.**

The type of dependency is set via its stereotype. At least one relationship template for dependencies needs to exist in the model to be able to create a dependency between business use cases (see page A-93). Once you have created a dependency using these templates, you can then change all properties of this dependency at a later stage.

Only one dependency can exist between two business use cases.

How to proceed

If you want to create an include dependency between business use cases:

» Select the business use case which should use the tasks of another business use case.

» Then select the business use cases/s which contain/s the subtasks to be used. Ensure that a relationship between the business use cases does not already exist.
» Select `Insert>Dependency><Relationship Template>`.
If there isn't a relationship template which contains the «include» stereotype, you need to change the stereotype.
» Select the dependency and select `Edit>Properties...`.
The dialog box of the same name appears.
» In the tab `Element Properties`, select the desired stereotype in the selection cell in the column `Value`.
» Close the dialog box with `[OK]`.
An arrow links the business use cases.

How to proceed

For an extend dependency between business use cases, proceed as with include dependencies. However, if the order which you select the business use cases concerned is different:

» Select the business use case which contains the subtask which should be used by other business use cases (the extended business use case).
» Then select the business use cases which should be extended by the subtasks.
» Proceed as described above.

If you want to create a **generalization** between business use cases, set the direction of the inheritance by the order in which the model elements concerned are selected.

How to proceed

To create an inheritance relationship between business use cases:

» Select the business use case which should be the parent.
» Then select the business use cases which should be the sons.
» Select `Insert>Generalization><Relationship Template>`.
An arrow from the sons to the parent are created respectively.

Other Information

- chapter B-2.2.7, "Creating and Changing Relationships", page B-42
- chapter B-2.5, "Removing and Deleting Elements", page B-61

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Entering Case Differentiations for Extensions

For business use cases which are linked with others by dependencies with the «extend» stereotype, you can display which case the extension will take place in: do this by defining extension points. Refer to this extension point in the extend dependency.

How to proceed

To define an extension point in a business use case:

» Lock the business use case which is to be extended by another one (the one which the dependency arrow with the «extend» stereotype points towards) and select `Edit>Properties...`.

» The dialog box of the same name appears.

» Select the tab `Extension Points`.

» Enter the name of the extension point in the field `Name` and click on `[Add]`.
The extension point appears in the list.

» Assign all of the business use case's extension points in this way.

» Finally, close the dialog box with `[OK]`.

Attention

If a dependency's «extend» stereotype is changed to another one (not «extend»), references to the extension points are then lost for the dependency.

How to proceed

To link a dependency with the «extend» stereotype to this extension point:

» Select the dependency and select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Extension Points`.
All extension points which are already defined in the linked business use case are listed in the drop-down list `Name`.

» Select the desired extension point in the drop-down list `Name` and click on `[Add]`.
The extension point appears in the list.

» Finally, close the dialog box with `[OK]`.

D-4.1.3 Tips for Text Descriptions about Use Cases

You have created a graphic depiction for requirements with the business use case diagram's elements; these should conform to the system. When naming business use cases, it is a good idea to use an expression made up of a noun and a verb (e.g. `Student log-in`).

For a meaningful document which forms the basis when creating other systems, a text description of the model element is indispensable. Innovator provides its own text editor for descriptions. Read how to use the text editor in chapter C-2, "Specifying Elements", page C-9.

Contents of the Description

UML does not make any specifications for which aspects should be taken into consideration during the description of business use cases. However, it is a good idea to take one of the following points into consideration in the description.

Note

Description of business use cases often forms the basis of a discussion and decision points during talks with customers and departments. Ensure that you use the language used by the partner involved in the talk here. This avoids misunderstandings or enables you to see them earlier on and smooth out any issues.

- **Summary:** lists the goals in the current business use case in a few words.
- **Prerequisites:** prerequisites are listed here so that the current business use case's tasks can be carried out (e.g. successful log-in to the system).
- **Normal flow:** describes the standard case of the current business use case. It's a good idea to have a numbered enumeration of the individual activities here.
- **Junction flows:** if other tasks are also carried out to reach the desired goal, these can be listed here.
- **Open questions, decisions etc.:** there's space for notes about the current status of the course of the project, with regard to the business use case.

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D-4.2 Displaying Time Flow of Communication (Sequence Diagram)

You can graphically display your system's business use cases in the business use case diagram and specify which properties, deviations and error cases each business use case has. You can describe various scenarios for each business use case with freely enterable text for this purpose (see page D-88).

Now display one or all of these scenarios in the sequence diagram. Each sequence diagram specifies the interaction of various objects for a certain flow in a business use case. You can depict various views using the sequence diagram:

- The **internal** view of a business use case, i.e. the way the business use case can be executed within the system.
- The **external** view of a business use case, i.e. the way the actors integrate within the system.

The interchange of messages between Elements is depicted chronologically. Display the chronological sequence of the events (messages) by arranging the messages in their sequence under each other. The later an interchange of messages takes place, the lower down in the diagram they will appear.

Read about the differences between the sequence diagram and the collaboration diagram on page D-104.

Elements of a Sequence Diagram

You can use the following elements in the sequence diagram:

- Objects (see page D-93)
- Activations (see page D-94)
- Messages (see page D-97)
- Time section boundaries (see page D-102)
- Time requirements (see page D-102)

D-4.2.1 Creating and Changing a Sequence Diagram into a Use Case

Sequence diagrams describe the time flow of a business use case's individual scenarios.This means that a sequence diagram is normally assigned a business use case. You can also change this assignment at a later time.

Various business use case scenarios are listed in the business use case's text description (see chapter D-4.1.3, "Tips for Text Descriptions about Use Cases", page D-88). You can now create a sequence diagram for each of these scenarios. You can create any number of sequence diagrams for each business use case in the business use case diagram or in the model browser.

Prerequisites

To be able to create a sequence diagram, the following things need to be provided in your model's configuration:

- Creation of sequence diagrams is enabled (see page D-187).
- The desired diagram types are provided in the model browser's `Element>New Diagram>Sequence Diagram` menu or in the `Engineering>Create Sequence Diagram` in the diagram editors (see page D-193).
- Sequence diagrams are permissible in the package in which you want to create the sequence diagram (see chapter A-3.4.1, "Setting Permissible Elements", page A-60).

Creating New Sequence Diagrams

Create a sequence diagram from the model browser or business use case diagram.

- Enter the business use case in the business use case diagram.
- Either enter the business use case in the model browser or only enter the package and then assign a business use case to the new diagram.

How to proceed

To create a sequence diagram:

» Open the business use case diagram with the business use case which you want to create a sequence diagram to.

» Select `Engineering>Create Sequence Diagram><Configured Type>`.

or

» Open the model browser and open the package which you want to create the sequence diagram in. If necessary, select the desired business use case.

» Select `Element>New Diagram>Sequence Diagram><Diagram Type>`.

When creating from the business use case diagram–as long as another package is not configured for sequence diagrams(see page A-68)–the sequence diagram is created in the package which also contains the business use case.

Opening Sequence Diagrams

Open an existing sequence diagram either via the model browser or the assigned business use case diagram.

A sequence diagram is normally assigned a business use case. It can also be activated from an assignment.

How to proceed

To open a sequence diagram from the **model browser**:

» Open the package which contains the sequence diagram. Sequence diagrams are stored in the package where the business use cases are also stored as standard.

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» Select the diagram which you want to open and select `Element>Open`.
The sequence diagram is opened.

How to proceed

To open an assigned sequence diagram from the business use case diagram:

» Open the business use case diagram which contains the business use case which you want to open a sequence diagram for.
» Select the business use case which the sequence diagram is assigned to and select `Jump>Reference...`.
The dialog box of the same name appears. An entry `sequence diagram` is shown in the column `Element type` for each of the business use case's sequence diagrams.
» Select the `sequence diagram` entry in the column `Element type`.
» Click on the name of the sequence diagram which you want to open in the column `Name` and close the dialog box with `[Jump]`.
The sequence diagram is opened.

Read how to display information about the diagram in chapter D-2.3.1, page D-57.

Changing the Assignment

If you create a sequence diagram for a business use case, the sequence diagram is automatically assigned to this business use case. You can change or completely resolve this assignment at a later time.

You can change the assignment of a sequence diagram to a business use case yourself in the model browser or sequence diagram.

How to proceed

To change assignment of a sequence diagram to a business use case:

» Jump to the model browser, open the package which contains the sequence diagram and select the sequence diagram which you want to assign another business use case to; then lock it.
» Select `Engineering>Assign to...`.
The dialog box of the same name appears.
» Select the tab `Use Case`.
All business use cases which are visible from the current package are listed in the drop-down list `Name` (see chapter A-3.2.3, "Producing Relationships Between Packages", page A-48).
» Select the business use case in the drop-down list `Name` which you want to assign the sequence diagram to.
or

» Click on [Select].
The dialog box Choose Item appears. Read how to work in this dialog box in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» Click on [Assign] in the dialog box Engineering/Assign to and close the dialog box with [Close].
The sequence diagram is assigned to the selected business use case.

Resolving Assignments

If you resolve the assignment of a sequence diagram to a business use case, you can only open it using the model browser.

How to proceed

To resolve the assignment of a sequence diagram to a business use case:

» Select the sequence diagram whose assignment you want to resolve in the model browser and lock it.

» Select Engineering>Assign to....
The dialog box of the same name appears.

» Select the tab Use Case.
The business use case which is currently assigned to the sequence diagram is shown in the drop-down list Name.

» Click on [Remove] and close the dialog box with [Close].

Read how to assign a sequence diagram which has not been assigned to a business use case in section "Changing the Assignment", page D-92.

D-4.2.2 Depicting how Objects Participate in the Communication (Activation)

You can use sequence diagrams in the Innovator Business edition to examine communication aspects between objects. To do this, use the objects which participate in communication within a business use case.

Object

An object is an element that participates in working through a business use case. The period of its existence is shown by a vertical, dotted line (lifeline). Above the line, the name of the objects and its class is shown in a rectangle in the form Object name:Class name, as long as both are not hidden (see page D-58).

An object can influence activity flows, but it does not have to. It is then identified as an active object and shown with a black frame (see page D-49).

Objects that can occur several times in the system are referred to as multiple objects. They are symbolized by two subsequent objects (see page D-49).

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Attributes are available in objects which are defined for the assigned class. You can add other attributes, individually show and hide attributes and assign them special values (see page D-50).

Actor

The actor is a special object that is not part of the internal system. It is–in contrast to other objects–always capable of affecting activity sequences. The actor in the sequence diagram corresponds to the one in the business use case diagram.

Activation

An activation depicts a period during which the respective object participates in the communication.

An activation describes the period in which an object plays a role within the framework of the modeled business use case. An activation is depicted by a narrow rectangle which proceeds the object's vertical line (lifeline).

You can split activations:

- **Sequentially:** two sub-activations appear one after another on the same lifeline (see page D-96).
- **Parallel:** the lifeline is split up; a sub-activation is shown on each section (see page D-96).

Activations need to be set for some work. Special rules need to be adhered to for this (see page D-94).

Other Information

- chapter D-2.1, "Creating and Modifying Objects, Activities and Actors", page D-38
- chapter D-2.2, "Working with Attributes and States", page D-50
- chapter B-2.3.2, "Moving Elements in Another Package", page B-53
- chapter B-2.5, "Removing and Deleting Elements", page B-61
- chapter D-2.3, "Modifying the Display of Elements", page D-57

Note

An object can be only be positioned in a vertical direction as standard. To position an object anywhere, both the object itself, its lifeline and its activation need to be selected. Only then can any position be selected. To do this, drag a capture frame over the object and all of its dependent elements or click on the object with the Ctrl and shift keys pressed.

Selecting Activations

When working with activations, it is often important where you clicked within the activation: For an activation's sequential splits this is split up where you clicked.

Note

Please ensure that you leave enough space to insert further graphic elements in the diagram, otherwise the command will not be offered. Due to the fact that new activations have a set length, activations can also not be clicked too close to the top or bottom margin.

Creating Activations

The activation is a narrow rectangle which is found on the object's lifeline. An activation needs to exist for the object before you can send a message.

If you want to create a recursive message you need the sending parent activation, as well as its son activation (see section "Creating Activations for Recursive Messages", page D-95).

How to proceed

If you want to create an activation:

» If necessary, lock the diagram.

» Ensure that lifeline section which you want to create the activation on

- Affords enough space and
- Does not belong to one of the lifeline's branches.

If necessary, move an existing activation or extend the lifeline (see page D-94).

» Select the section and select `Insert>Activation`.
A new activation is created on the lifeline.

Creating Activations for Recursive Messages

Recursive messages are calls from methods within their own object. A recursive message can only be created in Innovator if two activations are available for an object: A calling parent activation and a receiving son activation.

Note

Any nesting depth of recursive activations is possible.

How to proceed

You need a son activation on the calling action to be able to create a recursive message.

» If necessary, lock the diagram.

» Ensure that the activation which you want to create a recursive message for (which you want to create the son activation on) offers enough space. If necessary, enlarge the activation (see page D-94).

» Select the activation and select `Insert>Activation`.
A small son activation is created on the activation. You can only create a recursive message from the parent activation to the son activation (see chapter D-4.2.3, "Working with Messages", page D-98).

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Splitting and Merging Activations

There are two ways to split activations:

- **Sequentially:** Splitting an activation in two activations which follow each other chronologically.
- **Parallel:** Splitting an activation into two parallel activations to show junctions or processes at the same time.

You can merge activations which are one after another on the same lifeline into one activation (see page D-97).

How to proceed

The diagram must be locked during all of these tasks.

» If necessary, lock the diagram.

Sequentially Splitting Activations

You can sequentially split an activation as long as it is not in a lifeline's parallel branch. The activation can also be a son activation.

How to proceed

To sequentially split an activation:

» Ensure that the activation
  - Is large enough for two activations and
  - Does not belong to one of the lifeline's branches

  If necessary, enlarge the activation.

» Click where you want to split the activation (see page D-94). Ensure that no son activations are there. If necessary, move the son activation.

» Select `Edit>Split>Sequential`.
  The activation is split into two smaller activations one below the other.

Splitting Activations into Parallels

If you want to split an activation into parallels, create a branched lifeline. Each of the branches has a section of the original activation. You can create other parallel branches from parallel branches of activations. All of a lifeline's branches automatically merge into one point again.

Note **You cannot remerge activations which have been split into parallels to an activation. However, you can individually delete the parallel branches.**

How to proceed

To split an activation into parallels:

» Select the activation which you want to split. Ensure that it is not a son activation.

» Select `Edit>Split>Parallel`.
The activation is split into two parallel activations. The lifeline is split before and rejoined after.

Merging Activations

You can merge two activations into one. The following prerequisites must be met:

- Do not combine more than two respective activations in one step.
- It concerns two activations of the same object lifeline one after another i.e. not parallel activations.

How to proceed

To merge two sequential activations:

» Select the two activations and select `Edit>Merge`.
Both activations are merged into one.

D-4.2.3 Working with Messages

Messages show the communication between objects.

Messages are made up of stimuli which can be sent from one object of a sequence diagram to another. A message is shown by an arrow from the object (its activation) which sends the message to the one which receives it.

If the time needed to send a message can be disregarded, the message arrow is shown horizontally. If the transfer needs time then the message arrow is displayed as angling downwards.

You can create and change messages (see page D-98), as well as change the course of the messages (see page D-101).

Formulating Conditions

If messages are only sent once certain conditions are fulfilled, enter this condition. Messages can have a label in the

```
[Condition] Name
```

format. The condition is optional. The message can be branched due to such conditions.

You can enter iterations instead of a condition.

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Constraints

Messages normally run between activations of two objects. However, an object itself (its rectangle or icon) can also be a message's target. This corresponds to creation of this object. The following constraints need to be taken into consideration:

- Object icons can only be the target, not the source, of messages.
- A maximum of one message runs into an object icon.
- Only activations of other objects can be used as the source of a message for an object icon.

Procedure

Messages are always assigned to a class in diagrams in the Innovator Business edition. If you create such an Element, you first have to decide which class it should originate from.

Note

You can also assign another class to a message at a later date (see page D-46).

In another step you have to decide whether you will

- Create a new message of the selected class in the model and allow it to be seen in the diagram

  or

- Create a (further) display of a message which already exists in the model (see page D-98)

Correspondingly, each existing message of this class has its own entry in the menu `Insert>Message><Configured Type>` (see page D-40).

Creating Messages

You can create the following messages:

- From activation to object icon (if the object will be created by this)
- From activation to activation

Note

From your previous work, you will have noticed the objects are always from a specific type which needs to be specified as classes in the model. The same applies for messages: At least one class needs to be defined in the model (see page D-187) and provided in the sequence diagram's `Insert` menu to be able to create them (see page D-192).

How to proceed

If you want to create a message:

» If necessary, lock the diagram.
The order in which you select the elements determines the direction of the message.

» Select the activation which the message should be sent from.

» Also select the object icon or activation which should receive the message. Observe the constraints which exist when a message is created (see page D-98).

» Select

- `Insert>Message><Configured Type>` for a new message. Make sure that the `Insert>Message>Add Existing` menu item is deactivated. You can also see if this is done from the corresponding icon in the toolbar on the left-hand side.
- `Insert>Message><Configured Type>` for displaying a message which already exists again. Make sure that the `Insert>Message>Add Existing` menu item is activated. You can also see if this is done from the corresponding icon in the toolbar on the left-hand side.

The message is created.

Changing Messages

You can change a message. The following changes are possible:

- **Name:** all messages can have a name (see page D-99).
- **Class:** a message is always from a specific class. You can change this class (see page D-100).
- **Destroying target objects:** when displaying a created object by pulling the message between an activation and the object icon to be created yourself, the destruction is displayed by an "X" on its activation (see page D-100).
- **Direction:** you specified the direction of the message through the order in which you selected the objects/activations when creating. You can reverse the direction (see page D-100).
- **Condition/iteration:** this condition is formulated if a condition is dependent on whether a message is sent. If a message should occur more than once, formulate it as an iteration condition (see page D-100).

Read about how to set another sender or recipient of a message in section " Assigning a Relationship to a New Model Element", page B-45.

How to proceed

To change a message:

» If necessary, lock the diagram.

» Select the message which you want to change and select `Edit>Properties...`.
The dialog box of the same name appears.

How to proceed

To change a message's name:

» Select the tab `Name` in the dialog box `Edit/Properties`.

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» Enter the new name in the field Name or select one from the drop-down list.
» Click on [Apply].

How to proceed

To reverse the direction of the message:

» Select the tab Properties in the dialog box Edit/Properties.
» Activate the check box Invert direction and click on [Apply].

How to proceed

To destroy the target object:

» Select the tab Properties in the dialog box Edit/Properties.
» Activate the check box Destroy object and click on [Apply].

How to proceed

To formulate a condition:

» Select the tab Condition in the dialog box Edit/Properties.
» Enter the condition in the field Condition or select one from the drop-down list.
» Set whether it concerns a condition or a description of the repetition using the alternatives in the group box Type and click on [Apply].
» Finally, close the dialog box with [OK].

Changing a Message's Class

When creating a message, enter which class it should be from. You can enter another class at a later stage.

How to proceed

To assign a message to another class at a later date:

» Lock the diagram.
» Select the message.
» Select Edit>Properties....
The dialog box of the same name appears.
» Select the tab Class.
All classes which are provided in the model and are permissible for the current diagram are listed in the drop-down list Name.
» Enter the class in the field Name or select one from the drop-down list.
or

» Click on [Select].
The dialog box Choose Item appears. Read how to work in this dialog box in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» Close the dialog box Edit/Properties with [OK].
The message is assigned to the new class.

Displaying Alternatives

You can change the course of the messages. The following changes are possible:

- Displaying branches (alternatives) by joining another object to the communication (see page D-101). The new message arrow has a bend.
- Remerging branches (alternatives) (see page D-101)

Alternatives are made up of various messages which run from the same starting point and go to

- Various recipients or
- Parallel activations to a recipient.

They are shown as arrows with bends in them. To create a case differentiation, first create one of the alternative messages and split it into a second step.

How to proceed

If you set a message for a second recipient and want to split the message:

» Create the first message (see page D-98) and select it.

» Also select the object or activation which should be the alternative recipient of the message.
The activation cannot be sender or recipient of the message yet. Observe the constraints which exist when a message is created (see page D-98).

» Select Edit>Split>Message.
The message is split into two branches.

» Enter names etc. for the new message, as described on page D-99.

Ending Alternative Processes

To show the end of an alternative process, create another message in the existing message which has the same target.

Note

Messages which already exist cannot be merged.

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How to proceed

If you want to create a new message which has the same target as one which already exists:

» Select the message which contains the target the new message should point to.

» Also select the activation which should be the new sender of the message.

The activation cannot be sender or recipient of the message yet. Observe the constraints which exist when a message is created (see page D-98).

» Select `Edit>Merge`.

Another message is created which has the same target as the selected message, but another source.

» Enter names etc. for the new message, as described on page D-98.

D-4.2.4 Working with Time Section Boundaries

Time sections can be used for visual structure of a sequence. A time section's borders are shown as horizontal, dotted lines. As the specifications are not checked, the time section boundaries can also simply be implemented as a graphical means of making the diagram clearer.

Timing Constraints

Execution length of a sub-sequence can be specified by a time constraint. The timing constraint is shown by an arrow which links both borders of a timing constraint.

Creating Time Section Boundaries

You can group your sequence diagram using time section boundaries. Time section boundaries cannot be labeled.

How to proceed

To create a time section boundary:

» If necessary, lock the diagram.

» Click on a free point in the diagram at the same height as the border should appear and select `Insert>Time Section Boundary`.

A horizontal, dotted line is created as a time section boundary at the height of the selected point. The length of the line is already specified by the elements already available.

Creating Timing Constraints

You can store a timing constraint for each time section which you create from two time section boundaries (see chapter D-4.2.4, page D-102). At least two time section boundaries need to exist. However, the time section boundaries which you formulate the requirement for cannot be successive to each other.

How to proceed

To formulate a timing constraint for a time section:

» If necessary, lock the diagram.

» Select precisely two time section boundaries and select `Insert>Timing Constraint`.

A vertical double arrow links the two time section boundaries.

» To formulate the constraint, select the timing constraint and select `Edit>Properties...`.

The dialog box of the same name appears.

» If required, select the tab `Name` and formulate the timing constraint in the field `Name`.

» Close the dialog box with `[OK]`.

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D-4.3 Displaying Structural Organization of Objects (Collaboration Diagram)

Collaboration diagrams and sequence diagrams function in similar ways. If you have already used sequence diagrams, you will find it easy to get to grips with the elements in the collaboration diagram.

Elements of a Collaboration Diagram

You can use the following elements in the collaboration diagram:

- Objects and actors (see page D-93)
- Relationships
- Messages (see page D-109)

Differences between the Diagram Types

While the sequence diagram focuses on the chronological order of messages between objects, the collaboration diagram considers the structural organization of these objects. The following fundamental differences exist between both diagram types:

Aspect	Sequence diagram	Collaboration diagram
Displaying the chronological order of messages	Arranging messages top down	Messages between two objects are numbered
	Time section boundaries	--
Relationship type	--	Relationship stereotype
	--	Role of the objects concerned
	--	Direction of the object relationship

D-4.3.1 Creating and Changing Collaboration Diagrams

Collaboration diagrams specify the organization of objects which are involved in a communication. These interactions are frequently specified first in a business use case. A collaboration diagram is normally assigned a business use case. You can also change this assignment at a later time.

Various business use case scenarios are listed in the business use case's text description (see chapter D-4.1.3, "Tips for Text Descriptions about Use Cases", page D-88). You can now create a collaboration diagram–as well as a sequence diagram–for each of these scenarios. You can create any number of collaboration diagrams for each business use case in the business use case diagram or in the model browser.

If you create a collaboration diagram for a business use case, the collaboration diagram is automatically assigned to this business use case. You can change or completely resolve this assignment at a later time (see page D-106).

Prerequisites

To be able to create a collaboration diagram, the following things need to be provided in your model's configuration:

- Collaboration diagram creation is enabled (see page D-187).
- The desired diagram types are provided in the `Insert` menu (see page D-193).
- Collaboration diagrams are permissible in the package in which you want to create the collaboration diagram (see chapter A-3.4.1, "Setting Permissible Elements", page A-60).

Creating New Collaboration Diagrams

Create a collaboration diagram from the model browser or business use case diagram.

- Enter the business use case in the business use case diagram.
- Either enter the business use case in the model browser or only enter the package and then assign a business use case to the new diagram.

How to proceed

To create a collaboration diagram:

» Open the business use case diagram with the business use case which you want to create a collaboration diagram to.

or

» Open the model browser and open the package which you want to create the collaboration diagram in. If necessary, select the desired business use case.

» Select `Element>New Diagram>Collaboration Diagram><Diagram Type>`.

When creating from the business use case diagram–as long as another package is not configured for collaboration diagrams (see page A-68)–the collaboration diagram is created in the package which also contains the business use case.

Opening Collaboration Diagrams

Open an existing collaboration diagram either via the model browser or the assigned business use case diagram.

A collaboration diagram is normally assigned a business use case. It can also be activated from an assignment.

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How to proceed

To open a collaboration diagram from the **model browser**:

» Open the package which contains the collaboration diagram. Collaboration diagrams are stored in the package where the business use cases are also stored as standard.

» Select the diagram which you want to open and select `Element>Open`.
The collaboration diagram is opened.

How to proceed

To open an assigned collaboration diagram from the **business use case diagram**:

» Open the business use case diagram which contains the business use case which you want to open a collaboration diagram for.

» Select the business use case which the collaboration diagram is assigned to and select `Jump>Reference...`.
The dialog box of the same name appears. If a business use case is already assigned to a collaboration diagram, the entry `collaboration diagram` is shown in the tab `This Model` in the column `Element type`.

» Select the `collaboration diagram` entry in the column `Element type`.

» Click on the name of the collaboration diagram which you want to open and close the dialog box with `[Jump]`.
The collaboration diagram is opened.

Read how to display information about the diagram in chapter D-2.3.1, page D-57.

Changing the Assignment

You can change the assignment of a collaboration diagram to a business use case yourself in the model browser or collaboration diagram.

How to proceed

To change assignment of a collaboration diagram to a business use case:

» Jump to the model browser, open the package which contains the collaboration diagram and select the collaboration diagram which you want to assign another business use case to; then lock it.

» Select `Engineering>Assign to...`.
The dialog box of the same name appears.

» If applicable, select the tab `Use Case`.
All business use cases which are visible from the current package are listed in the drop-down list `Name` (see chapter A-3.2.3, "Producing Relationships Between Packages", page A-48).

» Select the business use case in the drop-down list `Name` which you want to assign the collaboration diagram to.

or

» Click on `[Select]`.

The dialog box `Choose Item` appears. Read how to work in this dialog box in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» Click on `[Assign]` in the dialog box `Engineering/Assign to` and close the dialog box with `[Close]`.

The collaboration diagram is assigned to the selected business use case.

Resolving Assignments

If you resolve the assignment of a collaboration diagram to a business use case, you can only open it using the model browser.

How to proceed

To resolve the assignment of a collaboration diagram to a business use case:

» Select the collaboration diagram whose assignment you want to resolve in the model browser and lock it.

» Select `Engineering>Assign to...`.

The dialog box of the same name appears.

» Select the tab `Use Case`.

The business use case which is currently assigned to the collaboration diagram is shown in the drop-down list `Name`.

» Click on `[Remove]` and close the dialog box with `[Close]`.

Read how to assign a collaboration diagram which has not been assigned to a business use case in section "Changing the Assignment", page D-92.

D-4.3.2 Working with Objects

A collaboration diagram shows the relationships between objects which are involved in an interaction, as well as messages which are sent between objects. They show the control flow between the objects involved within the structural organization.

The option to display an object or actor and assign it properties corresponds to those in the sequence diagram (see page D-93).

Other Information

- chapter D-2.1.1, "Creating Objects, Activities and Actors", page D-38
- chapter D-2.1.2, "Renaming an Element", page D-42
- chapter D-2.1.3, "Determining an Element's Class (Configured Type).", page D-46

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- chapter D-2.1.4, "Specifying an Object's or an Actor's Properties", page D-49
- chapter D-2.2, "Working with Attributes and States", page D-50
- chapter B-2.3.2, "Moving Elements in Another Package", page B-53
- chapter B-2.5, "Removing and Deleting Elements", page B-61
- chapter D-2.3, "Modifying the Display of Elements", page D-57

D-4.3.3 Displaying Relationships between Objects

Structural organization of objects which are involved in a communication is displayed by relationships of objects to one another. Relationships between objects are a prerequisite for objects to be able to exchange messages.

Relationships contain one stereotype which specifies its type. You can assign role names to the relationship ends and display their navigability.

Messages

Messages show the communication between objects. They can be interpreted as operation calls by the receiving object.

You can create and change messages (see page D-109).

Creating Relationships

Only one or two objects can be involved in a relationship. Relationships between multiple objects are not possible.

How to proceed

If you want to create a relationship:

» If necessary, lock the diagram.

» Select the object that should be the message sender later.

» Then select the object that should be the message recipient. Ensure that a relationship between the objects does not already exist.

» Select `Insert>Link`

The relationship is created.

Entering the Relationship Type

Relationships contain one stereotype which specifies its type. Relationships (or their relationship ends) can have the following stereotype values as standard:

- **association:** the respective object is visible for the relationship.
- **self:** the respective object is the sender of the operation.
- **global:** the respective object can be found in the comprehensive validity range.
- **local:** the respective object can be found in the local validity range.

- **parameter:** the respective object is a parameter.

Read how to define other stereotype values for object relationship ends in chapter A-4.1.2, "Creating, Modifying and Deleting Property Values", page A-78.

How to proceed

To enter the type of relationship:

» If necessary, lock the diagram.

» Select the relationship and select `Edit>Properties...`.
The dialog box of the same name appears. For each object which is involved in the relationship, its name, a role and its current stereotype value, as well as its direction is displayed.

» Enter a role for the respective object in the field `Role` or select one from the drop-down list.

» Select a stereotype from the drop-down list `Stereotype`.

» If you want to give the relationship end an arrow point, activate the check box `<` or the `>`.

» Close the dialog box with `[OK]`.

Creating Messages

Messages are made up of stimuli which can be sent from one object to another. A message is shown by an arrow, which is attached to the relationship between sender and recipient of the object.

Note

From your previous work, you will have noticed the objects are always from a specific type which needs to be specified as classes in the model. The same applies for messages: At least one class needs to be defined in the model (see page D-187) and provided in the collaboration diagram's `Insert` menu to be able to create them (see page D-192).

The relationship between the objects needs to already exist to be able to create a message.

You can influence the direction of the message arrow upon creation. There are two options available for this:

- Enter the target object of the message.
- If a message which points in the desired direction already exists, adopt its direction.

How to proceed

If you want to create a message:

» If necessary, lock the diagram.

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» Select the relationship which the message should be attached to.

» To set the direction of the arrow, also select the object which the arrow should point to or select a message which already shows the desired direction.

» Select

- A `Insert>Message><Configured Type>` class with the `Add Existing` switch deactivated for a new message.
- `Insert>Message><Configured Type>` with the `Add Existing` switch activated for displaying a message which already exists again.

The message is created. If a message which is numbered is already attached to the relationship, the new message is automatically given the next higher number.

Changing Messages

You can change a message. The following changes are possible:

- **Name:** all messages can have a name (see page D-110).
- **Class:** a message is always from a specific class. You can change this class (see page D-100).
- **Creating/destroying:** set whether the object should be created or destroyed (see page D-111)
- **Direction:** you can reverse the direction of the message arrow (see page D-111).
- **Condition/iteration:** this condition is formulated if a condition is dependent on whether a message is sent. If a message should occur more than once, formulate it as an iteration condition (see page D-111).
- **Numbering:** The messages which are shown in the collaboration diagram are serially numbered. You can change a message' s number (see page D-111).

Read how to transfer a message to another relationship in section "Moving Messages", page D-112.

How to proceed

The diagram must be locked when changing a message:

» If necessary, lock the diagram.

How to proceed

To change a message's name:

» Select the message's label

» Select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Name` in the dialog box `Edit/Properties`.

» Enter the new name in the field Name or select one from the drop-down list.
» Click on [Apply].

How to proceed

To show that the receiver object should be created or destroyed upon receiving the message:

» Select the message's label.
» Select Edit>Properties....
The dialog box of the same name appears.
» Select the tab Properties.
» Activate the check box Destroy object and/or Create object and click on [Apply].

How to proceed

You can reverse the direction of the message if you have selected the message's arrow:

» Select the tab Properties in the dialog box Edit/Properties.
» Activate the check box Invert direction and click on [Apply].

How to proceed

To formulate a condition:

» Select the message's label.
» Select Edit>Properties....
The dialog box of the same name appears.
» Select the tab Guard.
» Enter the condition in the field Condition.
» Set whether it concerns a condition or an iteration using the alternatives in the group box Type and click on [Apply].

How to proceed

To set the message's numbering:

» Select the message's label, its arrow or the relationship itself
or
» Click on a free point in the diagram.
» Select Edit>Properties....
The dialog box of the same name appears.

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» Select the tab Numbering.
If the current message is the first in the relationship, no number is shown in the column Numbering. If, on the other hand, messages already exist, the current number is suggested in the field below the column Numbering.
If you have selected the relationship or the diagram, all messages which already exist in the relationship are listed.

» If necessary, select the desired message from the list.

» Enter the number of the message in the field below the column Numbering. Use decimal notation to display nesting.

» Click on [Apply] to assign the message the number.

» Finally, close the dialog box with [OK].

Moving Messages

You can enter another relationship for a message within the same diagram at a later stage.

How to proceed

To move a message from one relationship to another:

» Select the message which you want to move.

» The select the relationship which you want to move the message to.

» Select Edit>Reconnect.
The message is displayed in the other relationship.

Changing the Order

You can change the order of messages which are displayed in a relationship.

How to proceed

To change the order:

» Select the relationship and select Edit>Properties....
The dialog box of the same name appears.

» Select the tab Numbering.
All messages which are displayed in the relationship are listed in the Numbering and Name columns.

» Select the message whose position you want to change in the list and move it to the correct position using the [Up] or [Down] buttons.

» Click on [Apply] to assign the message the new position.

» Finally, close the dialog box with [OK].

Changing a Message's Class

When creating a message, enter which class it should be from. You can enter another class at a later stage.

How to proceed

To assign a message to another class at a later date:

» Lock the diagram.

» Select the message.

» Select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Class`.
All classes which are provided in the model and are permissible for the current diagram are listed in the drop-down list `Name`.

» Select a class from the drop-down list `Name` or click on `[Select]`.
The dialog box `Choose Item` appears. Read how to work in this dialog box in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» Close the dialog box `Edit/Properties` with `[OK]`.
The message is assigned to the new class.

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D-5 Specifying Activities in the Process Model (Activity Diagram)

The activity is the central building block of business process modeling. The **activity diagram** depicts the order in which activities take place, which actors and objects are involved in these activities, which object states are run through and which events trigger state changes. You can use activity diagrams to model simultaneously occurring and alternative flows. You can specify individual activities using either activity definition diagrams or make more exact specifications using refinement diagrams (in turn, activity diagrams).

Activity diagrams are generally assigned to an activity or a use case, however, they are also used to depict flows applicable for all use cases.

Note

The elements which you can use individually in the activity diagram are set for the respective model by a so-called configuration which is managed by the administrator. For more information, also read chapter D-8, "What to do When Something Doesn't Work (Troubleshooting)", page D-221.

Elements of Activity Diagrams

You can use the following element types in the activity diagram

- To specify **flows** in the process:
  - Activities (see chapter D-5.2.1, page D-120)
  - Start and end connectors (see chapter D-5.3.1, page D-134)
  - Transitions/control flows (see chapter D-5.3.2, page D-135)
  - States, container (see chapter D-5.2.6, page D-130)
- To specify **flow variants**:
  - Forks (see chapter D-5.3.3, page D-138)
  - Branches (see chapter D-5.3.3, page D-138)
  - AND/OR connectors (see chapter D-5.3.3, page D-138)
  - Conditions, global conditions (see chapter D-5.3.4, page D-140)
  - Initiating Events (see chapter D-5.3.4, page D-140)
  - Actions (see chapter D-5.3.4, page D-140)
- To model **participants** to the process:
  - Actors (see chapter D-5.2.2, page D-122)

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  - Objects, multiple objects, active objects (see chapter D-5.2.2, page D-122)
  - Associations (see chapter D-5.2.7, page D-131)
  - Flows (see chapter D-5.3.5, page D-145)
  - Dependencies (see chapter D-5.2.7, page D-131)

- To display **responsibilities**:
  - Swim lanes (see chapter D-5.2.3, page D-125)
  - Associations (see chapter D-5.2.7, page D-131)
- To visualize **communication**:
  - Messages (see chapter D-5.2.4, page D-126)
  - Send and receive events (see chapter D-5.2.5, page D-128)
- To insert **textual information** in the diagram:
  - Constraints (see chapter D-5.2.8, page D-133)
  - Notes (see chapter D-5.2.8, page D-133)

D-5.1 Creating and Assigning Activity Diagrams

An activity diagram is normally assigned to a use case or (if it is an activity's refinement diagram) to an activity, i.e. the diagram appears in the reference list of such an element. Each activity within an activity diagram cannot be assigned to more than one refinement diagram (see chapter D-5.1.2, "Creating Refinement Diagrams for an Activity", page D-117). This means that every activity can have an ordered tree structure of specified diagrams, depending on detail.

D-5.1.1 Creating and Opening Activity Diagrams

There are many ways to create an activity diagram:

- Only enter the package which should store the activity diagram in the model browser. This means that you always create the root of a new tree from activity diagrams.
- Enter a use case which should be specified by the new diagram in the model browser or in a use case diagram. This means that you also create the root of a new tree from activity diagrams. You can create any number of activity diagrams for each use case.

Note **If a refinement diagram exists for a use case, the name of the use case appears in the use case diagram according to the configuration.**

- To create a refinement diagram, enter the activity which should be specified in more detail by a new diagram in the model browser or in an activity diagram. You can only create one refinement diagram for each activity.

How to proceed

To create a new activity diagram, which is to be the first diagram in a tree:

» Select the package which you want to create an activity diagram in the model browser's model tree.

or

» Select the use case to be specified in the model browser's detail view.

or

» Open the use case diagram with the use case which should be specified by the activity diagram. Lock it and select the desired use case.

All diagram types which exist in the configuration's activity diagram are listed in the `Engineering>Create Activity Diagram` menu (see chapter D-8, "What to do When Something Doesn't Work (Troubleshooting)", page D-221).

» Select `Engineering>Create Activity Diagram><Configured Type>`.

The activity diagram is created and–as long as you have created it from a use case diagram–opens as well.

D-5.1.2 Creating Refinement Diagrams for an Activity

To be able to create a refinement diagram for an activity, the activity needs to already exist in the model. It is irrelevant whether this activity is already shown in an activity diagram or not.

Note

If you create a refinement diagram, you can choose between all configuration types which exist for activity diagrams in the configuration model.

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How to proceed

To create a refinement diagram for an activity which already exists:

» Select the package in the model browser which contains the activity and select this in the list of model elements.
All configured types which exist in activity diagrams in the configuration model are listed in the `Element>New Diagram>Activity Diagram><Diagram Type>` menu. The entries are only activated if no other refinement diagram already exists for an activity.
or

» Open the activity diagram which the desired activity diagram should be displayed in and select it.
The `Create Refinement Diagram` menu item is shown in the `Engineering` menu. The entry is only activated if no other refinement diagram already exists for an activity.

» Select `Engineering>Create Activity Diagram` or `Engineering>Create Refinement Diagram`.
The activity diagram is created and–as long as you have created it from the diagram–opens as well.

D-5.1.3 Changing or Resolving the Assignment

If you create an activity diagram for an activity, this is automatically assigned to the activity. The same applies for an activity diagram for a use case. Get assignments of this type from the model browser's `Reference` menu item or detail view.

Changing Assignments

You can assign another element to an activity diagram at a later date:

- Another activity, as long as it does not have a refinement diagram
- Another use case
(You can also assign more diagrams to a use case.)

How to proceed

To change the assignment:

» Jump to the model browser and select the activity diagram.

» Lock the diagram.

» Select `Engineering>Assign to...`.
The dialog box of the same name appears. There is a tab for each respective assignment to another activity or another use case.

» Select the desired tab.

- All activities which are already available in the model and do not already have a refinement diagram are listed in the tab `Activity` in the drop-down list `Name`.
- All business use cases which are already available in the model are listed in the drop-down list `Name` in the tab `Use Case`.

» Select the element in the drop-down list `Name` which you want to assign the activity diagram to.

or

» Click on `[Select]`. Proceed as described in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» Click on `[Assign]`.

» If you want to assign the diagram to another element, repeat these steps in the respective tab.

» Finally, close the dialog box with `[Close]`.
The activity diagram is assigned to the selected element.

Resolving Assignments

If you resolve all assignments of an activity diagram, you can only open it using the model browser.

Note

Assignment of an activity diagram to an activity or a use case can be seen as both of them have the same name: The diagram automatically adopts the name of the assigned element. This name similarity can be deleted once the assignment–as previously described–is removed.

How to proceed

To resolve the assignment of an activity diagram:

» Jump to the model browser and select the activity diagram.

» Lock the diagram.

» Select `Engineering>Assign to...`.
The dialog box of the same name appears. There is a tab for each respective assignment to another activity or another use case.

» Select the desired tab.
If the activity diagrams is assigned to an element of the respective type, the element is shown in the field `Name`.

» Click on `[Remove]` and close the dialog box with `[Close]`.

Other Information

Read how to assign an activity diagram which has not yet been assigned to an element in section "Changing Assignments", page D-118.

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D-5.2 Working with an Activity Diagram's Model Elements

Over the following pages you will learn how to:

- Insert model elements in the activity diagram,
- The prerequisites which must be met
- What the results of the insertion procedure look like
- How to change or edit elements

Note **When talking about inserting in this chapter, inserting in the activity diagram itself is always meant. Only activities, objects and global conditions can also be inserted into the model browser.**

Note **You need to make a so-called refresh by clicking on `View>Refresh` ([F5]) before a newly inserted model element appears in the activity diagram's corresponding `Insert` menu.**

Note **If you plan to work with swim lanes, you should insert these first and set whether separation lines should run horizontally or vertically. This means that it will then be easy to arrange the other elements in the diagram.**

Other Information chapter D-2.1.1, "Creating Objects, Activities and Actors", page D-38

D-5.2.1 Working with Activities

Activities are individual procedures in a work flow which take time. An activity can be refined by other sub-activities until activities which no longer make sense to refine occur. For more information you can also read D-5.1.2, "Creating Refinement Diagrams for an Activity", page D-117.

Normally only one reference to an activity is inserted in an activity diagram, i.e. removing the activity from the diagram (menu item `Edit>Remove from Diagram`) does **not** delete the activity in the model. The menu item `Edit>Delete`, on the other hand, also deletes the activity in the model.

If you insert an activity which does not already exist in the model, this is then stored in the same package which contains the diagram and, if necessary, after an update has been made to the diagram in `Insert` menu. You can find the appropriate entries in the `Insert>Activity><Configured Type>` menu. Using the `Insert>Add Existing` switch, you can switch between

- Inserting new activities in the model and in the diagram, and

- Inserting activities which already exist in the model in the diagram.

Switch activation is shown in the toolbar on the left-hand side. You can display the same activities as many times as required in the diagram.

Other Information

- chapter D-8, "What to do When Something Doesn't Work (Trouble-shooting)", page D-221
- chapter D-2.1.1, "Creating Objects, Activities and Actors", page D-38

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

Note

Activities and objects can also be created in the model browser by selecting the desired package and `Element>New>Activity><Configured Type>`**.**

How to proceed

To create a new activity:

» Click on a free point in the diagram.

» Select `Insert>Activity><Configured Type>` with the `Add Existing` switch deactivated.
The activity appears in the diagram.

» Select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Name`.

» Enter the name of the new activity in the field `Name` or select one from the drop-down list. Click on `[OK]`.
The activity is renamed.

How to proceed

To display an activity which already exists in the model:

» Click on a free point in the diagram.

» Select `Insert>Activity><Configured Type>` with the `Add Existing` switch activated for an activity which already exists.
The activity appears in the diagram.

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Other Information

- To transform a created activity into another activity which already exists in the model, read chapter D-2.1.2, "Renaming an Element", page D-42.
- To assign a created activity to another class, read chapter D-2.1.3, "Determining an Element's Class (Configured Type).", page D-46.
- To influence the icon display of a created activity, read chapter D-2.3.3, "Modifying Icons for a Diagram's Objects, Activities and Actors", page D-60.

D-5.2.2 Working with Actors, Objects and Multiple Objects

Objects are the basis of the selected object types (classes) in the Innovator Business edition edition which are set in the configuration model. (More precisely: an object in the activity diagram is an instance of a pre-configured class; also see chapter D-7.3, "Preparing Classes for Elements", page D-187). Objects are mainly used to model products and resources which take part in the process. An existing object can also be converted in a swim lane (see chapter D-5.2.3, "Working with Swim Lanes", page D-125) or displayed as an active or multiple object.

Actors are special objects which normally specify people or other systems in certain roles (e.g. customers, clerks) which are used to interact with the company. As a special object, an actor is an instance of a pre-configured class of the «actor» stereotype.

Note **As actors in the model are also objects with particular properties, the following about objects also applies for actors. Unless otherwise explicitly noted, "objects and actors" will henceforth be described as "objects" to allow for easier reading.**

Normally only one reference to an object is created in an activity diagram, i.e. removing the object from the diagram (menu item `Edit>Remove from Diagram`) does not delete the object in the model. The menu item `Edit>Delete`, on the other hand, also deletes the object in the model.

If you insert an object which does not already exist in the model, this is then stored in the same package which contains the diagram and, if necessary, after an update has been made to the diagram in `Insert` menu. You can find the appropriate entries in the `Insert>Object><Configured Type>` menu. Using the `Insert>Object>Add Existing` switch, you can switch between

- Inserting new objects in the model and in the diagram, and
- Inserting objects which already exist in the model in the diagram.

Switch activation is shown in the toolbar on the left-hand side.

Other Information

- chapter D-8, "What to do When Something Doesn't Work (Trouble-shooting)", page D-221
- chapter D-2.1.1, "Creating Objects, Activities and Actors", page D-38

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

How to proceed

To create a new object:

» Click on a free point in the diagram.

» Select `Insert>Object><Configured Type>` with the `Add Existing` switch deactivated.
The object appears in the diagram. It is stored in the model in the package which also contains the activity diagram which you created it in.

» Select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Name`.

» Enter the name of the new object in the field `Name` or select a name from the drop-down list. Click on `[OK]`.
The object is renamed.

How to proceed

To create an object which already exists in the model:

» Click on a free point in the diagram.

» Select `Insert>Object><Configured Type>` with the `Add Existing` switch activated.
The object appears in the diagram.

Other Information

- To transform a created object into another object which already exists in the model, read chapter D-2.1.2, "Renaming an Element", page D-42.
- To assign a created object to another class, read chapter D-2.1.3, "Determining an Element's Class (Configured Type).", page D-46.
- To influence the icon display of a created object, read chapter D-2.3.3, "Modifying Icons for a Diagram's Objects, Activities and Actors", page D-60.

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Working with Multiple Objects

If an object appears in various instances in a workflow and if e.g. messages should be sent to all instances, it can be graphically displayed as a multiple object.

How to proceed

To transform an existing object into a multiple object:

» Select the object and select `Edit>Properties...`.

» Select the tab `Properties` and activate the check box `Multiple object`.
The object is displayed as a multiple object.

Other Information

- chapter D-2.1.4, "Specifying an Object's or an Actor's Properties", page D-49

Identifying Objects as Active

Objects which are not initially involved by a message in the workflow can be modeled as active objects with a black border. (This does not apply for actors, as they exist outside of the workflow and are therefore always active in the sense of the word.)

How to proceed

To identify an object as active:

» Select the object and select `Edit>Properties...`.

» Select the tab `Properties` and activate the check box `Active`.
The object appears in a black border in the diagram.

Other Information

- chapter D-2.1.4, "Specifying an Object's or an Actor's Properties", page D-49

Adding States to an Object

Objects in the activity diagram can be involved in various states in the workflow. You can assign objects to any number of states. This is displayed in the object in square brackets.

How to proceed

To assign states to an object:

» Select the object and select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `State`.

» Enter the state in the field `Name` or select it from the drop-down list `Name`.

» Click on `[Add]`.
The state is adopted in the list.

» Repeat this for each desired state.

» To change the order of states, select one of the states in the list and move it to the desired position using `[Up]` or `[Down]`.

» Finally, click on `[OK]`.
The list of given states is shown in the object in square brackets.

How to proceed

To suppress states being shown:

» Remove all selections in the diagram and select `Edit>Properties...`.

The dialog box of the same name appears.

» Go to the tab `Display` and select the `Object` entry from the drop-down list `Element`.

» Deactivate the check box `Show state`.

» Close the dialog box with `[OK]`.

Other Information

- chapter D-2.1.4, "Specifying an Object's or an Actor's Properties", page D-49

D-5.2.3 Working with Swim Lanes

You can divide an activity diagram either vertically or horizontally so that an object's responsibilities for this activity appear from the activity's position: Reserve a lane, a so-called swim lane, for each object which is responsible for editing. Activities which the object is responsible for are then arranged in this swim lane.

Note

If you plan to work with swim lanes, you should create these first and set whether separation lines should run horizontally or vertically. This means that it will then be easy to arrange the other elements in the diagram.

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

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How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

How to proceed

To create a swim lane:

» If not already done, create the object which you want to create the swim lane for, as described in D-5.2.2, "Working with Actors, Objects and Multiple Objects", page D-122.
» Ensure that the object does not have any relationships to other model elements in the diagram.
» Select the object and select `Edit>Properties...`.
The dialog box of the same name appears.
» Select the tab `Properties` and activate the option button `Horizontal swimlane` or `Vertical swimlane`, depending on your requirements.
The object appears as a swim lane in the diagram.

How to proceed

To change the height or width of a swim lane:

» Select the swim lane.
» Hold the separation line at one end and pull it to the desired size.
» If necessary, move the entire swim lane within the diagram.

D-5.2.4 Working with Messages

Messages specify the communication of model elements within a workflow or stand for results which influence the workflow. They can be created between

- An object and an activity
- Two activities

Messages form the basis of pre-configured classes of the «signal» stereotype.

Classification of Messages as Object References

The following section only deals with messages which are visualized in the diagram as a relationship between two model elements.

In Innovator Business, you also have the option of visualizing messages as object references of a pre-configured class in the diagram. You can do this by clicking on a free point in the diagram and `Insert>Message><Configured Type>` with the desired entry selected. The model element created in this way can be edited just as with an object.

The reason for this display option is so that you can configure your own diagram types in Innovator Business. It is often also necessary to be able to display messages as objects in a corresponding object diagram.

However, in the Innovator Business' activity diagram, it is also preferable to model messages in workflows in this way from a methodical point of view. This means that when giving information at this point it is enough to say that if you still want to create messages in this way, you can find a description of how to use them in the sections about objects.

Other Information

- chapter D-2.1, "Creating and Modifying Objects, Activities and Actors", page D-38
- chapter D-2.3, "Modifying the Display of Elements", page D-57
- chapter D-7, "Setting the Use of Elements in the Configuration Model", page D-181

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

Creating Messages

If you create a message which does not already exist in the model, this is then stored in the pre-configured package (see chapter D-8.3, "If you Cannot Find Entries in the Model Browser or Menus", page D-223) and, if necessary, after an update has been made to the diagram in `Insert` menu. Correspondingly, there is a `Use Existing` switch in the `Insert>Message><Configured Type>` menu for each message already available in the menu. You can display the same message as many times as required in the diagram.

Note

Alternatively, you can work with send or receive events. For more information, read D-5.2.5, "Working with Send and Receive Events", page D-128.

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How to proceed

To create a new message:

» Select the sending model element first and then the receiving one.

» Select `Insert>Message><Configured Type>` with the `Use Existing` switch deactivated.
The message appears as an arrow between the selected model elements.

» Select the message and select `Edit>Properties...`.

» Select the tab `Name`.

» Enter the desired name in the field `Name` and close the dialog box with `[OK]`.
The message is labeled accordingly.

How to proceed

To create a message which already exists in the model:

» Select the sending element first and then the receiving one.

» Select `Insert>Activity><Configured Type>` with the `Use Existing` switch activated for a message which already exists.
The message appears in the diagram.

Other Information

- To transform a message into another message which already exists in the model at a later stage, read chapter D-2.1.2, "Renaming an Element", page D-42.
- To assign a message to another class at a later stage, read chapter D-2.1.3, "Determining an Element's Class (Configured Type).", page D-46.

D-5.2.5 Working with Send and Receive Events

Alternatively, you can also model messages as send and receive events. These are shown as concave or convex pentagons within the control flow. **Receive events** stand for wait states in the workflow, whereas **send events** can be regarded as an alternative way of displaying actions (see chapter D-5.3.4, "Working with Events, Conditions, Global Conditions and Actions", page D-140) (see figure on page D-31).

Object references are not created with these events. Instead, a message of a pre-configured class is created. You can create a message's relationships to other model elements at a later stage. Relationships to activities (transitions) are shown with solid arrows; relationships to objects and actors are shown with dashed arrows.

When creating you need to decide whether you want to create a new event or use an event already available in the model.

The `Use Existing` switch is correspondingly deactivated or activated in the `Insert>Send Action` menu.

Note

Even though the graphic icons appear to be completed, the send and receive events do not have to always be created as pairs.

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

How to proceed

To create a new send or receive event:

» Click on any free point in the diagram.
» Select
- `Insert>Send Action><Configured Type>`

or

- `Insert>Wait for Message><Configured Type>` with the `Use Existing` switch deactivated.

The element is created with the message type's name.

How to proceed

To display a send or receive event which already exists in the model:

» Click on any free point in the diagram.
» Select
- `Insert>Send Action><Configured Type>`

or

- `Insert>Wait for Message><Configured Type>` with the `Use Existing` switch activated.

The element appears in the diagram.

Other Information

- To transform a created send or receive event into another one which already exists in the model, read chapter D-2.1.2, "Renaming an Element", page D-42.

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- To assign a created send or receive event to another class, read chapter D-2.1.3, "Determining an Element's Class (Configured Type).", page D-46.

D-5.2.6 Working with States and Containers

Instead of using receive events, you can also model wait states in the workflow using so-called regular **states**. Please ensure that transitions which run out of these states are coupled with an event which sets when the wait state can be left.

If a state has sub-states, these can be modeled using **containers** and multiple states, as well as transitions and initial/final states, can be mapped. A diagram is made, as it were, within the activity.

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

How to proceed

To create a state:

» Click on a free point in the diagram.
» Select `Insert>State>Wait State`.
The state appears in the diagram.
» Select `Edit>Properties...`.
You can enter the state designation in the tab `Name` and field `Name`.
» Click on `[OK]`.
The desired state exists in the diagram.

Working with Containers

If sub-states whose transitions should also be modeled exist for a state, you can use so-called **container states** for this purpose. You work with model elements in such a container

- State
- Transition
- Connector
- Activity

How to proceed

To create a container:

» Click on a free point in the diagram.
» Select `Insert>State>Container State`.
  The empty container appears in the diagram.
» Select `Edit>Properties...`.
  You can rename the container in the tab `Name` and field `Name`.
» Click on `[OK]`.
  The container exists in the diagram and can be filled with the elements described above.

How to proceed

To transform an existing state in a container:

» Select the state and select `Edit>Properties...`.
  The dialog box of the same name appears.
» Activate the check box `Container` in the tab `Name` and close the dialog box with `[OK]`.
  The state is transformed into a container.

Note

If a container has activities, you can assign them resources (as in the activity diagram) by creating an association between the resource object and the container. For more information, read D-5.2.7, "Working with Associations and Dependencies", page D-131.

D-5.2.7 Working with Associations and Dependencies

In Innovator Business' activity diagrams, it is possible to create relationships between

- Objects and activities
- Objects and container states

These are identified as **associations** and primarily convey the fact that an activity processes or uses an object in any form. They can be specified more precisely using names (e.g. "carries out"). The significance is the same between objects and containers, as long as activities are modeled within the container.

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

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How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

How to proceed

To create an association

» Select two model elements (in any order) which you want to link using an association.
» Select `Insert>Association`.
The association appears as a solid line between both model elements.

How to proceed

To rename an association:

» Select the association and select `Edit>Properties...`.
» Select the tab `Name`.
» Enter the name in the field `Name` or select it from the drop-down list `Name`. This contains the names of the configured association types.
» Click on `[OK]`.
The name of the association appears in the diagram.

Working with Dependencies

Dependencies can exist between two elements of the type object, activity, state and container, as long as it is provided in the configuration model (see chapter D-8.1, "What You Should Know about Configuration", page D-222). An example of this can be dependencies between activities and targets. If dependencies exist in the model, you have a direction which is also explained by the configuration.

How to proceed

To create a dependency:

» Select two model elements of the type also specified in the order which corresponds to the reading order of the dependency.
» Select `Insert>Dependency`.
The dependency is displayed in the diagram as a dashed arrow.

How to proceed

To rename a dependency:

» Select the dependency and select `Edit>Properties...`.

» Select the tab `Name`.

» Enter the name in the field `Name` or select it from the drop-down list `Name`.

» Click on `[OK]`.
The name of the dependency appears in the diagram.

D-5.2.8 Working with Constraints and Notes

Constraints in general identify the option of inserting additional model information as text in the diagram. This includes implementation information at a later stage, as well as possible workflow information which is difficult to specify using UML. Constraints are used if you want to locate this information in the diagram yourself and not only in the textual specification in the background.

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

How to proceed

To create a constraint:

» Select the model element which you want to append the constraint to.

» Select `Insert>Constraint`.
The commentary text is created and linked with the object by a dashed line. You can use `Edit>Properties...` to formulate the text as you wish.

Working with Notes and Links

You can also store as many configurable notes as comments in activity diagrams as you require and link these with any number of diagram elements.

How to proceed

To create a note:

» Click on any free point in the diagram
or

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» Select a model element.

» Select `Insert>Note`.

The note appears in the diagram and is then immediately linked with the selected object by a dotted line. You can customize the note's text using `Edit>Properties...`.

How to proceed

To attach a note with a model element:

» Select the note and the desired model element.

» Select `Insert>Attachment`.

The link appears as a dotted line in the diagram.

Note **The difference between a constraint and a note is purely a methodical one: There are no restrictions when using notes; constraints on the other hand are–as the name says–restricted.**

D-5.3 Working with Control Flows and Flows

The order of **activities** in an activity diagram is set by the so-called **control flow** and specified using

- Initial and final states
- Transitions
- Branches
- Forks

If you want, these types of control flows can be displayed in the diagram as bold arrows (see page D-137).

On the other hand, you can create transitions between **objects** which e.g. specify the development of an object produced or involved during a flow. In this case, you talk about **flows**.

In the Innovator Business edition edition's activity diagram, however, flows can be used as control flows. For more information, read D-5.3.6, "Using Flows as Control Flows", page D-146.

D-5.3.1 Working with Start and End Connectors

An **initial state** shows access in a flow and is shown by a small black circle, which can be labeled if desired. Although it is possible to model various initial states in a diagram, this should be avoided.

A **final state** identifies the end of the entire workflow and is shown as a circle with a black center–the so-called bull's eye–which can be labeled to model various final conditions if desired. Consequently, an activity diagram will usually contain various final states.

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

How to proceed

To create a start or end connector:

» Click on a free point in the diagram.
» Select `Insert>Connector>Start` or `End`.
The corresponding connector appears in the diagram.

How to proceed

To name a start or end connector:

» Select the connector and select `Edit>Properties...`.
» Enter the name in the field `Name`.
» Finally, click on `[OK]`.
The name of the connector appears in the diagram.

D-5.3.2 Working with Transitions

A transition is a state change that is caused by an event. A transition typically links two activities and is activated when the first activity is completed. Transitions specify the flow of processes and, therefore, the so-called **control flow**. Specification of the completed event can specify conditions, global conditions and actions linked with these in detail.

Permissible Conditions

The following conditions need to be fulfilled when creating, joining and making new connections in conjunction with initial and final states:

- An initial state is always the **source** of a transition. There can be no more than one outgoing transition and this cannot be involved in a junction.

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- Final states are always the **target** of a transition. They cannot be involved in a branch or parallelism.

Creating and Changing Transitions

A transition is shown as an arrow between activities or states. The elements need to already exist to be able to create a transition. Transitions can be created between two model elements of the type

- Activity
- Initial and final state
- Regular state or container state
- Send and receive event
- Connector

As well as between combinations from the model elements specified. If you only select one activity before creating the transition, a recursive transition is created.

Note

If you create a transition between an activity and an object or actor, in doing so you create a flow! You can recognize this fact by the arrow being dashed and not drawn through. For more information, read D-5.3.5, "Working with Flows", page D-145.

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

How to proceed

To create a transition:

» Select two model elements in the order which corresponds to the order of the transition.

or

» Select the activity which you want to create a recursive transition for.

» Select `Insert>Transition`.

The transition appears as an arrow between both model elements and, depending on its type, is either drawn through or dashed.

Reversing the Direction

If you want to reverse the direction of a transition, permissible conditions (see page D-135) cannot be damaged.

How to proceed

To reverse the direction of a transition:

» Select the transition and select `Edit>Reconnect>Invert`.
The direction is reversed.

Changing the Source

You can enter another source for a transition at a later stage. The following constraints need to be taken into consideration:

- The new source cannot already be a transition's source.
- The permissible conditions for transitions cannot be damaged by the changes (see page D-135).

How to proceed

If you want to assign another source for a transition:

» Select the element which should be the new source for the transition.
» Then select the transition which you want to transfer and select `Edit>Reconnect>Source`.
The element is assigned to the transition as the source.

Changing the Target

You can enter another target for a transition at a later stage. The following constraints need to be taken into consideration:

- The new target cannot already be a transition's target.
- The permissible conditions for transitions cannot be damaged by the changes (see page D-135).

How to proceed

If you want to assign another target for a transition:

» Select the element which should be the new target for the transition.
» Then select the transition which you want to transfer and select `Edit>Reconnect>Target`.
The element is assigned to the transition as the target.

Emphasizing Control Flows

If you want, transitions which are part of a control flow can be visualized as a **bold** arrow. Innovator recognizes whether this applies for a transition or not itself.

As this can only be carried out by an administrator, please contact your administrator to carry out this setting. If you can log-in as administrator yourself, do this and proceed as follows:

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How to proceed

To emphasize control flows:

» Jump to the model browser and select `Model>Configuration>General Settings...`.
The dialog box of the same name appears.

» Select the tab `Display Options` and activate the check box `Show control flow` in the group box `Control flow`.

» Close the dialog box with `[OK]`.
Control flows in the model's activity diagrams are now displayed in bold.

More Information

- D-5.3.6, "Using Flows as Control Flows", page D-146
- D-5.3.4, "Working with Events, Conditions, Global Conditions and Actions", page D-140

D-5.3.3 Working with Branch and Fork Connectors

There are two ways to branch flows in activity diagrams:

- **Conditional branches** can either be modeled using various outgoing transitions which run out of an activity (read D-5.3.2, "Working with Transitions", page D-135) or by using an alternative connector which is shown as a rhombus. The outgoing transitions are labeled solely with conditions which set the next flow. Alternative connectors can be used to rejoin branched flows via this connector.
- **Parallel flows** begin and end with a bar. The start of the branch identifies a fork connector. Joining branches takes place using an AND or OR connector, which specifies when it will occur in the flow, i.e.: Whether all incoming branches should be processed or at least only one.

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

How to proceed

To create or rejoin a conditional branch:

» Click on a free point in the diagram and select `Insert>Connector>Alternative`.
A rhombus appears in the diagram; you can append transitions to this if you want.

How to proceed

To create a parallel branch:

» Click on a free point in the diagram and select `Insert>Connector>Fork`.
A fork bar appears in the diagram; you can append transitions to this if you want. It can have no more than one inflowing transition.

Note

You can also give transitions which run out of a fork connector a condition, as with other transitions (compare D-5.3.4, "Working with Events, Conditions, Global Conditions and Actions", page D-140). This means that it is possible to individually deactivate the parallel traced flows, depending on the situation.

How to proceed

To rejoin a parallel branch:

» Click on any free point in the diagram and select `Insert>Connector>Join AND` or `Insert>Connector>Join OR`, depending on whether the inflowing transition should be joined using a logical AND or OR.
A bar with the appropriate logical icon appears in the diagram; you can append transitions to this if you want. It can have no more than one outgoing transition.

Editing Connectors

Connector bars can be displayed both horizontally or vertically in the diagram; you can also switch between the various types of connectors.

How to proceed

To change alignment of connector bars:

» Select the connector and select `Edit>Properties...`.
» Activate the option button `Horizontal` or `Vertical` in the tab `Type` in the group box `Alignment`.

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» Click on [OK].
The bar is aligned accordingly in the diagram.

How to proceed

To change a connector bar's type:

» Ensure that the transitions for the connector are compatible with the change or remove this beforehand.
» Select the connector and select Edit>Properties....
» Activate the option button Parallel split or AND join or OR join in the tab Type in the group box Type.
» Click on [OK].
The connector's type is adapted accordingly.

D-5.3.4 Working with Events, Conditions, Global Conditions and Actions

For UML, you can append

- Initiating events
- Conditions
- Global conditions
- Actions

to transitions to model further flow parameters.

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

Working with Events

You can display which event leads to the state transition by appending the event to the transition. You can only create one event for a transition.

How to proceed

To assign an initiating even for a transition:

» Select the transition and select Edit>Properties....
The dialog box of the same name appears.

» Select the tab `Event`.

» Then select a configured event type from the drop-down list `Class`.

or

» Click on `[Select]`. In this case, proceed as described on chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

The selected class appears in the field `Class`.

» Enter the event in the field `Event`.

or

» Select an event which already exists from the drop-down list `Event`.

or

» Click on `[Select]`. In this case, proceed as described on chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» Finally, click on `[Create]`.

The event is shown on the transition.

How to proceed

To remove an event from a transition:

» Select the transition and select `Edit>Properties...`.

The dialog box of the same name appears.

» Select the tab `Event`.

» Select the event in the field `Event` and click on `[Delete]`.

The event is removed.

Working with Conditions

Conditions are used to set which transition selected from various available ones should be followed in the next flow. Conditions should then cancel each other out to ensure uniqueness.

Conditions should always correspond to an activity's results (compare page D-141). You can only append one condition for a transition.

Only one of the transitions which runs out of a branch without specification can remain when using conditions. This is interpreted as the so-called ELSE condition and is triggered if no other conditions apply. For more information you can also read chapter D-6.1.3, "Assigning Probabilities to Conditions", page D-157.

How to proceed

To create a condition:

» Select the transition and select `Edit>Properties...`.

The dialog box of the same name appears.

» Select the tab `Guard`.

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» The activity whose result the condition should correspond to should be entered in the field `Activity`. The activities which run out of the transition are normally suggested However, if the transition runs out of a connector or you want to enter another activity from the diagram, select the desired activity from the drop-down list.

or

» Click on `[Select]`. In this case, proceed as described on chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» Then enter the desired condition in the field `Condition`.

or

» Select a condition which already exists from the drop-down list `Condition`.

Note **You can only enter a condition if you have selected the activity to be evaluated. However, if such an activity does not exist, you need to model the condition as a global condition (see chapter D-5.3.4, "Working with Events, Conditions, Global Conditions and Actions", page D-142).**

» Finally, click on `[Create]`.
The condition appears in square brackets on the transition.

Note **if the condition to a transition does NOT refer to the result of the activity which immediately proceeds it, the activity is entered as extra (in bold font) in the diagram below the condition; the condition then refers to this.**

How to proceed

To remove a condition:

» Select the transition and select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Guard`.

» Select the condition in the field `Condition` and click on `[Delete]`.
The condition is removed.

Working with Global Conditions

Global conditions model conditions which are not a result of an activity. Typical examples of this are `[[week day=Monday]]` or `[[computer available]]`. No more than one global condition is possible for a transition.

Note

Methodically-speaking, global conditions are only a good idea for branch connectors, not for transitions which result in an activity! Otherwise, discrepancies appear if this activity is refined, as the global condition then needs to correspond to one of the refinement's final states, but is independent of the flow per the definition.

You can

- model global conditions as a condition if you still haven't given the transition a condition
- or, if you have done this, then you can model global conditions as an event as long as you haven't already given the transition an event.

How to proceed

To create a global condition:

» Select the transition and select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Global Condition`.

» Enter the global condition in the field `Name`.

or

» Select a global condition which already exists from the drop-down list `Name`.

or

» Click on `[Select]`. In this case, proceed as described on chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» Set whether the global condition should appear as a condition or an event in the group box `Effect`.

» Finally, click on `[Create]`.
The global condition is shown on the transition in double square brackets if you modeled it as a condition; otherwise as an event.

How to proceed

To change how a global condition is displayed:

» Select the transition and select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Global Condition`.

» Change the setting whether the global condition should appear as a condition or an event in the group box `Effect`.

» Finally, click on `[Change]`.
How the global condition is displayed changes accordingly.

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How to proceed

To remove a global condition:

» Select the transition and select `Edit>Properties...`.
The dialog box of the same name appears.
» Select the tab `Global Condition`.
» Select the global condition in the field `Name` and click on `[Delete]`.
The global condition is removed.

Working with Actions

If which transition should follow is set by the flow or a condition and/or global condition, you can trigger additional actions at the same time with this decision. This includes e.g. messages to other model elements in the flow.

How to proceed

To create an action:

» Select the transition and select `Edit>Properties...`.
The dialog box of the same name appears.
» Select the tab `Action`.
» Enter the action in the field `Name`.
or
» Select an action which already exists from the drop-down list `Name`.
» Finally, click on `[Create]`.
The action appears with a slash in front of the transition.

How to proceed

To change an action:

» Select the transition and select `Edit>Properties...`.
The dialog box of the same name appears.
» Select the tab `Action`.
» Enter the new action in the field `Name`.
or
» Select an action which already exists from the drop-down list `Name`.
» Finally, click on `[Modify]`.
The action is changed.

How to proceed

To remove an action:

» Select the transition and select `Edit>Properties...`.
  The dialog box of the same name appears.
» Select the tab `Action`.
» Select the action in the drop-down list `Name`.
» Finally, click on `[Delete]`.
  The action is removed.

D-5.3.5 Working with Flows

You can create a **flow** between two objects (in contrast to a control flow between activities). The following prerequisites must be met for this:

- A transition cannot run out of the object which was selected first.
- A transition cannot run into the object which was selected second.

Note

Product flows were mentioned in earlier Innovator versions to express the division of objects in products and resources. This name will not be used any more.

Things you Should Always Take into Consideration

Over the following pages both of the following general prerequisites will not be explicitly mentioned:

How to proceed

To create or edit a diagram element:

» Lock the diagram and, if necessary, the elements affected.

How to proceed

To create a flow:

» Select both the desired objects in the order which should correspond to the change.
» Select `Insert>Flow`.
  The change appears as a dashed arrow between the two objects.

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How to proceed

To rename a flow:

» Select the change and select `Edit>Properties...`.
» Select the tab `Name`.
» Enter the name in the field `Name` or select it from the drop-down list `Name`.
» Click on `[OK]`.
The name of the flow appears in the diagram.

How to proceed

To change a flow's type:

» Select the flow and select `Edit>Properties...`.
» Select the tab `Element Properties`.
» Specify the desired stereotype in the column `Value` in the ´selection cell.
» Click on `[OK]`.
The flow contains the selected stereotype.

D-5.3.6 Using Flows as Control Flows

The are various equivalent options in the Innovator Business edition for modeling how objects are depicted in the flow. You should participate in the corresponding training days at MID GmbH for a complete overview. The two basic versions can be specified as follows:

- A flow can be created in parallel to a direct control flow (a transition) between two activities to and from an object, which is created by the first activity and needed by the second one.
- You can also view this mechanism by positioning the object virtually on the control flow yourself: In this case, a (dashed) transition from the first activity to the object and then one from the object to the second activity. Innovator Business implicitly recognizes that a control flow is available and, if this has been preset for flows, shows both these dashed transitions in black (see chapter D-5.3.2, "Working with Transitions", page D-137).

You can find an example for this modeled in the figure , page D-7.

D-5.4 Creating Activity Definition Diagrams for an Activity

You can also specify an activity in greater detail by displaying its sub-activities in another activity diagram or by entering an activity's complete system (other actors, objects etc. involved). You can then use an activity definition diagram to accomplish this. This is highly recommended if you frequently want to define used base activities. The activities affected naturally have to be in the model.

You can only create one definition diagram for an activity.

How to proceed

To create an activity definition diagram:

» Select the activity in the model browser and lock it.

or

» Open the activity diagram which contains the activity, select and lock it.

» Select `Engineering>Create Definition Diagram`. The entry is only activated if no other definition diagram already exists for an activity.
The definition diagram is stored in the same package as the respective activity. (If it isn't, read chapter D-8, "What to do When Something Doesn't Work (Troubleshooting)", page D-221). If you created this from the diagram, it opens automatically. It only contains the activity itself at the moment.

» If necessary, open the definition diagram.

» Select `Engineering>Adjust`.
All of the activity's relationships to other model elements from all other diagrams where the activity occurs appear in the definition diagram.

Note

Changes made to the diagram at a later stage which affect an activity are adopted in this activity's definition diagram by you selecting `Engineering>Adjust` there. It is not enough to simply refresh the diagram or click on `View>Refresh` in the model browser for the alignment to be adopted!

D-5.5 Setting Elements in the Activity Diagram

The following should outline various basic options for configuring how the diagram is displayed and are comparatively frequently used. This only concerns the activity diagram's interface, e.g. displaying a model element's states and classes, including its names and icons. For more in-depth set-

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tings–such as defining your own diagram type–contact your administrator or read chapter D-7, "Setting the Use of Elements in the Configuration Model", page D-181.

Setting How Model Elements are Displayed

You can decide how each model element type should be displayed in the activity diagram. These include options such as

- Displaying names and classes
- Displaying stereotypes and icons
- Displaying states, probabilities, shortnames

All of these settings affect the entire diagram of each available model element of the same type as the setting being made.

How to proceed

To edit model element's labeling:

» Remove all selections in the activity diagram and select `Edit>Properties...`.

» Select the tab `Display`.

» Select the element type from the drop-down list `Element` which you want to edit how it is displayed.
The possible alternatives to this element type appear in the tab.

» Adopt your settings and click `[Apply]` if you do not wish to make any further settings. Repeat this for all desired element types.

» Finally, click on `[OK]`.
The view is changed in the diagram.

Other Information

- chapter D-2.3.2, "Modifying Elements' Labeling", page D-58
- chapter D-2.3.3, "Modifying Icons for a Diagram's Objects, Activities and Actors", page D-60

Changing How Control Flows are Displayed

You can mark control flows in **bold** in an activity diagram if desired. However, you require administrator rights to make these settings. If you do not have these, contact your administrator, otherwise read how to make this setting in D-5.3.2, "Working with Transitions", page D-135.

D-6 Analyzing and Simulating Processes

In the Innovator Business edition edition, you can provide the modeled processes in activity diagrams with additional **performance indicators**, such as

- Probabilities
- Times
- Costs

and make analyses with regard to these indicators. To give a simple example: You can give a decision's individual alternatives probabilities and check the complete diagram to see which probabilities occur with the various modeled final states.

Note

To avoid a mix up with other Innovator areas, these types of analysis and simulation will not be fundamentally identified as "evaluations". The following pages will always refer to them as "process analyses" instead.

For example, process analyses are carried out by

- Operating business process optimization, based on the modeled business process
- Estimating project costs and time

You can implement **analytical calculations** i.e. the values to be obtained are directly calculated using closed formulas, as the process is run through once only. The conditions to be evaluated which correspond to the activities' results are always requested immediately after completion of these activities–and not later.

So-called **simulative process analyses** can be used with INNOVATOR 7 and above. These do not calculate the desired results using formulas; these are calculated instead using multiple run through of the processes described in the activity diagram. This is an extremely powerful tool which can be used to examine probabilities, costs and time of various tasks being implemented, as well as concurrent resource access, resource consumption and waiting times. Simulative process analysis is also available in those diagrams which do not enable analytical calculations due to technical reasons.

Over the following pages you will learn how to:

- Enter performance indicator in an activity diagram

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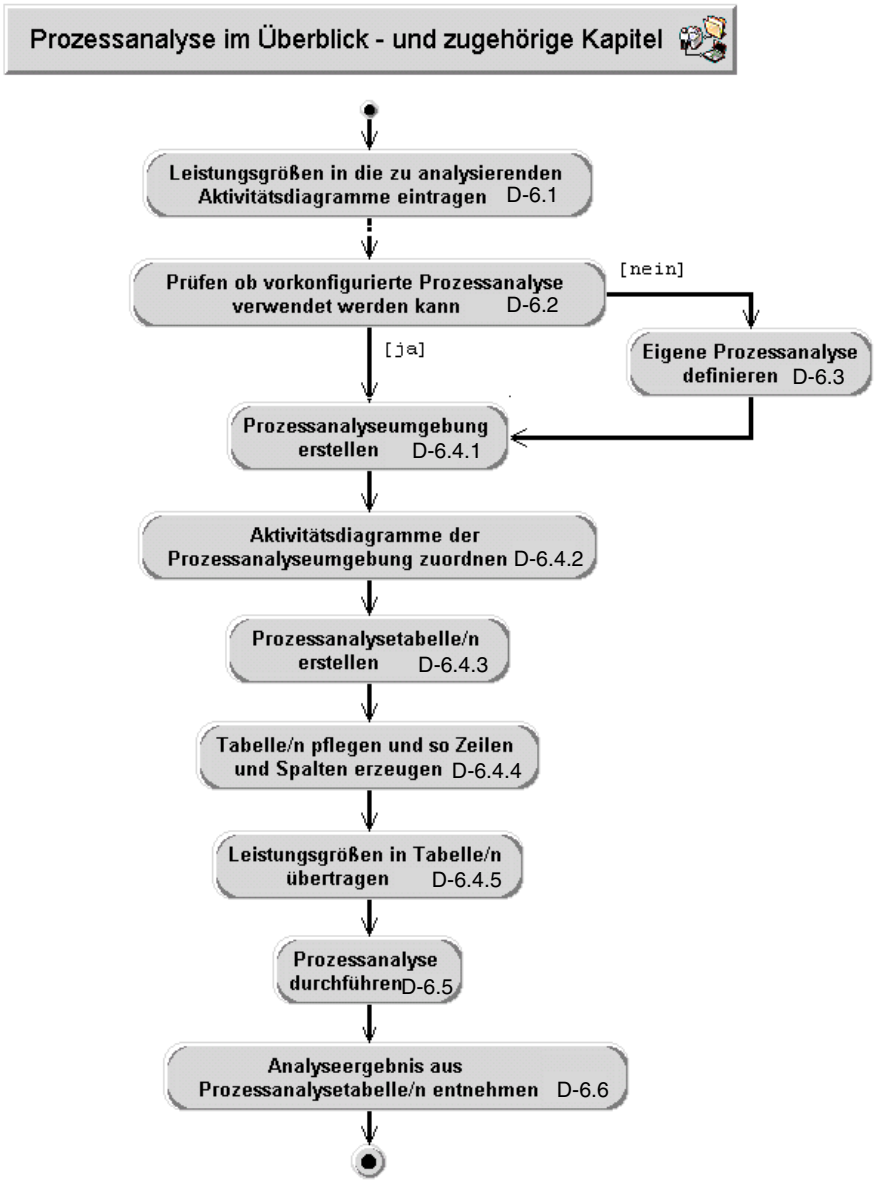
- Select the process analysis made
- Prepare the process analysis
- Implement the process analysis


Prozessanalyse im Überblick - und zugehörige Kapitel
Leistungsgrößen in die zu analysierenden Aktivitätsdiagramme eintragen D-6.1
Prüfen ob vorkonfigurierte Prozessanalyse verwendet werden kann D-6.2
[nein]
[ja]
Eigene Prozessanalyse definieren D-6.3
Prozessanalyseumgebung erstellen D-6.4.1
Aktivitätsdiagramme der Prozessanalyseumgebung zuordnen D-6.4.2
Prozessanalysetabelle/n erstellen D-6.4.3
Tabelle/n pflegen und so Zeilen und Spalten erzeugen D-6.4.4
Leistungsgrößen in Tabelle/n übertragen D-6.4.5
Prozessanalyse durchführen D-6.5
Analyseergebnis aus Prozessanalysetabelle/n entnehmen D-6.6

Procedure for Implementing a Process Analysis

D-6.1 Entering Performance Indicators in an Activity Diagram

As a user, you normally enter the following performance indicators in an activity diagram:

- **Probabilities**, which are assigned **conditions**. Conditions are coupled to branching **transitions** and query an activity's results (if it doesn't, then these are global conditions, see chapter D-5.3.4, "Working with Events, Conditions, Global Conditions and Actions", page D-140). Transitions do not require time, but can simply represent the transition between activities or states. This means that only the probability which applies to this condition on average can be used for a condition.
- **Times**, which are assigned **activities**. Activities need a certain period of time in which they are completed; you can append times (e.g. estimated hours of work) as attributes for this.
- You can also assign fixed costs.
- **Costs**, which are assigned **resources**. You can assign a resource costs per time unit. As well as time (which an activity needs), costs per activity can also be specified.

You can also use **random distribution** for simulations to set

- Which state tasks should come into the process in
- that varying indicators should specify the estimated processing time instead of set processing times

However, you first need to get to grips with the formats for performance indicators which are used during process analysis.

D-6.1.1 Performance Indicators and Their Formats

The respective form which probabilities, times, costs and distribution is given is set by the following predefinitions:

Entering Probabilities

Probabilities are not given as percentages, but as a real number between 0 and 1. Innovator uses four internal decimal places.

Example: `0.05` (for a probability of 5%)

Entering Times

Times are formulated as integers with the respective time measurement after it. Possible time measurements are

`Y` for year

`D` for day

`h` for hour

`m` for minute

`s` for second

Example: `1D3h16m` (for 1 day, 3 hours, 16 minutes)

One day does **not** normally mean 24 hours or one year 365 days; the data from `Y` and `D` go by the stored values for working day and working year in the model. You can find details in chapter D-6.1.6, "Setting Working Hours", page D-162.

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Entering Costs

Costs are entered as real numbers, whereas currency (EUR) needs to be explicitly entered. Innovator uses four internal decimal places.

Example: `79,50`

Entering Costs Per Time Unit

Such costs are entered in the form "costs (as above) + slash + time measurement (as above)".

Example: `5000/D` (for 5000 EUR per day)

Entering Distributions

You need to use distributions if you want to define your own simulations and/or if you do not want to model estimated processing times as fixed, but as randomly distributed indicators. You can enter the following distribution functions:

Constant Distribution

Format: Time measurement

Example: `11m30s`

Equal Distribution

Format: U(a;b)

a,b are time measurements and stand for the lower and upper limits of a time interval. a<b must apply.

Example: `U(35m;1h5m)`

Exponential Distribution

Format: E(m)

m is a time measurement and stands for the expected value.

Example: `E(3D4h)`

Normal Distribution

Format: N(m;s)

m,s are time measurements. m stands for the expected value and s for the standard deviation.

Example: `N(1D;20m)`

Other Formats for Simulation Results

Additional formats exist for results of simulative analysis. There are three definite formats which can be named:

Utilizations

Utilizations are entered as real numbers, which enter the utilization as relative to 100%.

Example: `2.15` corresponds to a utilization of 215%.

Frequency

Frequency is entered as a real number

Standard deviation is also entered as a real number. **Standard deviation**

D-6.1.2 Overview: What You Enter and What You Obtain

The following tables outline which information needs to be entered for preparation in the model and which performance indicators are specified for the subsequent calculation for analytical and simulative calculations.

The following indicators should be entered for analytical calculations: **Analysis: Entering**

Target	In the activity diagram	In the process analysis configuration
Calculation of probabilities	Probabilities of alternative transitions	Working hrs./days, Workings days/year
Calculation of costs	Fixed costs of activities and/or variable costs of resources (costs per time, number of resources)	
	Estimated processing time of activities	
Calculation of times	Estimated processing times of activities	

The following performance indicators are identified during analytical calculations: **Analysis: Output**

	At final states	At activities
Probabilities	Probability of achievement	Probability of achievement and/ or (for loops) medial run frequency
Costs	Process costs from the beginning	Activity costs + process costs from the beginning
Times	Processing time from the beginning	Processing time + processing time from the beginning

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Simulation: Entering The following indicators should be entered for simulative calculations:

Target	In the activity diagram	In the process analysis configuration
Calculation of probabilities	Probabilities of alternative transitions	- Distribution of distances for task arrival times - Condition, if the simulation should be canceled - If applicable, the recovery time - Working hrs./day, days/year
Calculation of costs	Fixed costs of activities and/or variable costs of resources (costs per time, number of resources)	
	Estimated processing time of activities (also possible as distribution)	
Calculation of times	Processing times of activities as estimated value or distribution	

Simulation: Output The following performance indicators are identified during simulative calculations:

	At final states	At activities	At resources
Probabilities:	Probability of achievement	Probability of achievement and/or (for loops) medial run frequency	---
Costs:	Medial process costs from the beginning + their variation	Medial costs of the activity + their variation	---
		Medial process costs from the beginning + their variation	
Times:	Medial process time from the beginning + its variation	Medial Processing Time	---
		Medial queue time + its variation	
		Medial process time from the beginning + its variation	
Utilization:	---	---	Utilization

Process Analysis: Input and Output Values The following table lists all attributes for process analyses again. The focus, however, lies on the criteria of whether an attribute

- serves for entering performance indicators or
- gets an output value upon successful process analysis

i.e.: The table makes it at once apparent which of the attributes offered for a model element is the right one to e.g. enter processing times, and where the calculated indicators were stored after process analysis implementation.

Analysis attributes:

Input values	Model element	Type	Meaning
Fixed costs	Activity	Costs	Fixed activity costs, independent of resources
Estimated value of processing time	Activity	Time	Empirical value for processing length
Probability	(Global) Condition	Probability	Transfer probability in a transition
Resources- Amount	Resources- Object	Integer	Indicators of assigned resource pool
Resource costs per time unit	Resources- Object	Costs//time unit	Resource-dependent costs per time
Relative frequency	Activity	Real number	Obtainable frequency
P (user-defined., i.e. no attribute)	End connector	Probability	Probability
Processing time-real	Activity	Time	Processing time in the model element
Processing costs-real	Activity	Costs	Processing costs in the model element
Processing costs-real	Activity, end connector	Costs	Total costs until model element
Process time-real	Activity, end connector	Time	Total time until model element

Simulation attributes:

Input values	Model element	Type	Meaning
Fixed costs	Activity	Costs	Fixed activity costs, independent of resources
Estimated value of processing time	Activity	Time	Fixed processing time, but also assignable as distribution
Probability	(Global) Condition	Probability	Transfer probability in a transition

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Simulation attributes:

Input values	Model element	Type	Meaning
Resources- Amount	Resources- Object	Integer	Indicators of assigned resource pool
Resource costs per time unit	Resources- Object	Costs//time unit	Resource-dependent costs per time
Relative frequency	Activity	Real number	Obtainable frequency
P (user-defined., i.e. no attribute)	End connector	Probability	Probability
Processing costs-real	Activity	Costs	Resource-dependent activity costs
Variation coefficient node costs	Activity	Standard deviation	Activity costs deviation
Medial processing time	Activity	Time	For distribution: Real used indicators
Medial queue time	Activity	Time	Average queue time within the activity's waiting loop
Queue time variation	Activity	Standard deviation	Queue time deviation before the activity
Processing costs-real	Activity, end connector	Costs	Total costs until model element
Process costs- variation	Activity, end connector	Standard deviation	Total cost deviation until the model element
Processing time-real	Activity, end connector	Time	Total time until model element
Processing time- variation	Activity, end connector	Standard deviation	Total time deviation until model element
Utilization	Resources- Object	Real number	Utilization of Resource in %

Simulation attributes:

Output value	Model element	Type	Meaning
Relative frequency	Activity	Real number	Obtainable frequency
P (user-defined., i.e. no attribute)	End connector	Probability	Probability
Processing costs-real	Activity	Costs	Resource-dependent activity costs
Variation coefficient node costs	Activity	Standard deviation	Activity costs deviation
Medial processing time	Activity	Time	For distribution: Real used indicators
Medial queue time	Activity	Time	Average queue time within the activity's waiting loop
Queue time variation	Activity	Standard deviation	Queue time deviation before the activity
Processing costs-real	Activity, end connector	Costs	Total costs until model element
Process costs- variation	Activity, end connector	Standard deviation	Total cost deviation until the model element
Processing time-real	Activity, end connector	Time	Total time until model element
Processing time- variation	Activity, end connector	Standard deviation	Total time deviation until model element
Utilization	Resources- Object	Real number	Utilization of Resource in %

D-6.1.3 Assigning Probabilities to Conditions

Probabilities at branching conditional transitions express the probability with which the respective transition is run through. They are therefore always linked to one of the following model elements:

- A condition that is supplied as a result by an activity in the process
- A global condition (independent of flow)
- a so-called ELSE condition

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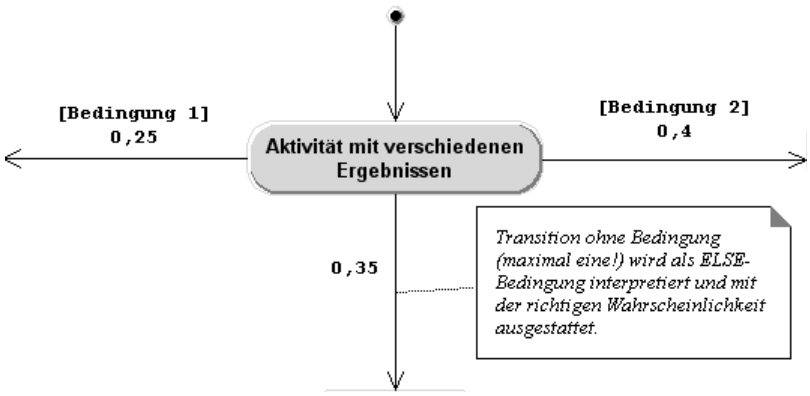
What is an ELSE condition?

If there are various transitions with conditions and assigned probabilities in a branch in a process and if one of these transitions doesn't have a condition (normally unlabeled), Innovator interprets this as an ELSE condition. i.e.: If none of the conditions apply to the other transitions, Innovator chooses the unlabeled transition. Innovator also automatically assigns–as long as the other conditions have probabilities–the probability which is still missing at the branch for the sum 1 to the transition.



Example of an ELSE Condition

No more than one transition which is involved in a branch can be unlabeled and, in doing so, be interpreted as an ELSE condition. Otherwise the other process progression can no longer be ascertained at this point.

Note **The sum of all probabilities at transitions, which run out of the same activity or the same connector, must always equal 1.**

Assigning Probabilities to Simple Conditions

Prerequisite for this is for an activity to exist in the flow, whose result can be used as a condition for the transition. The probability entered directly relates to this condition.

Note **If this is an unlabeled transition (ELSE condition), it cannot have any probabilities assigned to it or Innovator assigns the probability which is still missing at the branch concerned for the sum 1. The following steps are unnecessary in this case.**

How to proceed

To assign a probability to a conditional transition that leads out of an activity:

» If a condition is still not available at the transition, insert the desired condition at the transition, as described in chapter D-5.3.4, "Working with Events, Conditions, Global Conditions and Actions", page D-140. The condition appears in square brackets on the transition.

» Now select the activity which the transition should lead out of and select `Edit>Properties...`.
The dialog box of the same name appears.

» If applicable, jump to the tab `Probabilities`.
All conditions to outgoing transitions appear in the `Name`and `Probability` columns.

» Select the desired condition and enter the desired probability in the correct format (see D-6.1.1, "Performance Indicators and Their Formats", page D-151) in the field with the condition's name. Click on `[Apply]`.
The probability is assigned to the condition and the previous sum of all previous probabilities for the activity is automatically updated and displayed. This may not exceed 1.

» Repeat this for each desired probability and the close the dialog box with `[OK]`.
If the display of the probabilities in the activity diagram is activated (see , "Displaying Probabilities", page D-160), these appear at the respective conditions.

How to proceed

To assign a probability to a transition that leads out of a branch connector:

» Select the branch connector and select `Edit>Properties...`.
The dialog box of the same name appears. You will see a table which contains the conditions which exist to outgoing transitions in the tab `Probabilities`

» Select a condition. Enter the probability in the correct format (see D-6.1.1, "Performance Indicators and Their Formats", page D-151) in the field with the condition's name.

» Click on `[Apply]`.
The probability appears to the right of the condition and the sum of the probabilities for the connector are automatically updated. This may not exceed 1.

» Repeat this, if necessary, for each condition.

» Close the dialog box with `[OK]`.
The entered probabilities appear in the respective conditions in square brackets, as long as probability display (see , "Displaying Probabilities", page D-160) is activated.

Assigning Probabilities to Global Conditions

Global conditions which are independent of flow can also be equipped with probability occurrence. Unlike with simple conditions, this is only possible in the model browser.

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How to proceed

To assign a probability to a global condition:

» If applicable, jump to the model browser.
» Select the global condition and lock it.
» Select `Element>Properties...`.
The dialog box of the same name appears.
» If applicable, go to the tab `Probability`.
» Enter the desired value in the field `Probability` and click on `[Apply]`.
» Close the dialog box with `[OK]`.
If probability display is activated for global conditions (see , "Displaying Probabilities", page D-160), they appear in all models in diagrams in double square brackets.

Global Conditions and ELSE Conditions

Only one alternative condition can remain unlabeled for conditional branches and thereby be interpreted as an ELSE condition. If you assigned probabilities to the branching transitions, calculation of the ELSE condition probability occurs automatically (see page D-158). Innovator regards global conditions in the same way as simple conditions.

Displaying Probabilities

To set whether probabilities which you assigned to conditions and global conditions should be displayed in the diagram:

How to proceed

To set probability display:

» Remove all selections in the activity diagram and select `Edit>Properties...`.
The dialog box of the same name appears.
» If applicable, go to the tab `Display`.
» Select the `Condition` or `Global Condition` entry in the drop-down list `Element`.
The respective settings appear in the tab.
» Activate or deactivate the check box `Wahrscheinlichkeit anzeigen`. Click on `[Apply]`.
» Close the dialog box with `[OK]`.
The diagram display was customized according to your settings.

D-6.1.4 Assigning Costs or Times to an Activity

An activity's costs and times can be modeled as attributes of the activity. These attributes are preconfigured in the configuration model and can be customized by the administrator to suit his own specifications as and when desired. As a user, you can also set whether an activity's attributes should be displayed and which ones should be displayed (see chapter D-2.2.2, "Showing an Attribute", page D-53).

Global and Local Attribute Values

Two categories of attribute values can be differentiated between in process analysis:

- **Global attribute values** of an activity can be found in all models, i.e. each time an activity exists in a diagram.
- **Local attribute values** only apply for individual existences of an activity in a diagram.

Note

If both global and local attribute values exist for an activity, the local attributes apply.

Correspondingly, two tabs with these designations exist for an activity in `Edit>Properties...`. The attributes listed here are specified in greater detail and managed in the tab `Attributes`.

Other Information

- chapter D-2.2.1, "Adding and Modifying Attributes", page D-51
- chapter D-2.2.2, "Showing an Attribute", page D-53
- chapter D-2.2.3, "Assigning Attribute Values", page D-54

D-6.1.5 Assigning Attribute Values to Resources

If you want to calculate costs, you need to assign `Variable Costs` (costs per unit of time) and `Number` (of resources) indicators of the resources concerned with values. After assigning this information and storing the processing time for the associated activity, the desired costs can be analytically or simulatively calculated.

A similar procedure applies for calculating times: Resource costs are not necessary for this, but real processing times also depend on the amount of assigned resources.

Note

Not all associations between an activity and a resource are taken into consideration for simulations! The ones which are set by the administrator in the configuration model. For more information, read section "Incorporating Objects in the Simulation", page D-208.

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How to proceed

To assign performance indicators to a resource:

» Select the resource and select Edit>Properties....

» If necessary, jump to the tab Values (Global) or Values (Local), depending on where the performance indicator should be carried out and what the effect should be (see page D-161).
The available attributes are listed in the column Name and their current values are listed in the column Value.

» Select an attribute.

» Enter the desired value in the specified format in the entry cell in the column Value and click on [Apply].

» Repeat this for all desired attributes.

» Close the dialog box with [OK].
If the attribute display is set accordingly (see page D-53), the entered values appear for the resource.

D-6.1.6 Setting Working Hours

Fundamental indicators for making calculations are the number of

- Working hours per day and
- The workings days per year.

Note **You require administrator rights to make these settings for these values. If necessary, contact your administrator.**

What Causes These Specifications

The specifications above specify time value data in detail: If, for example, there are eight working hours per day set in a model and a calculation gives a time result of ten hours, this will be shown as 1D2h, i.e. the day specification does not normally correspond to a 24-hour day, but to the working day set in the model.

How to proceed

To set working hours:

» Go to the model browser and log-in as administrator (see chapter A-1.2.1, page A-5).

» Select Model>Configuration>Process Analyses....

» If applicable, go to the tab Working Hours.

» Enter the desired value in the Working hours per day and Working days per year fields and click on [Apply].

» Close the dialog box with [OK].
This value serves as the basis for all subsequent calculations when calculating times.

D-6.2 Selecting Process Analyses

Five preconfigured standard process analyses are delivered with the Innovator Business edition edition, among others. Two of these are analytical and three are simulative. The latter can be differentiated between by various distributions for interarrival times (i.e. time intervals) of incoming tasks.

Note

The process analyses described over the next pages are included, among others, within the scope of delivery in the model templates for office processes (SmartOffice) or production processes (SmartIndustry). That means: It concerns components of a profile and not Innovator's basic function! Depending on the scope of delivery, slight deviations may occur in the process analyses described.

These five process analyses are described over the following pages. You can find out how to change these or define new process analyses in chapter D-6.3, "Defining Your Own Process Analyses", page D-165.

Selecting Indicators to be Analyzed

In general, **probabilities**, **times** and **costs** can be calculated in analytical process analyses if required in a one-off diagram run (also refer to the tables from page D-153) for the following model elements:

- Probabilities
  - Probabilities of achievement for end states
  - Probabilities of achievements of individual activities or–if cycles exist in the activity–their relative frequency.
- Times
  - The real processing times of individual activities (based on the activity's estimated processing time and the number of resources assigned to it)
  - For individual activities of the previous process length (including the processing time of this activity)
  - The total process length to the end states
- Costs

  (as with times)

Simulative process analyses, on the other hand, get these values using multiple run through. For this they need

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- Specification of **distribution of interarrival times** for incoming tasks (i.e. the distances tasks should come into the process in are set for the initial state)
- A criteria for when simulation **cancelation** should occur (a time measurement or a number of run throughs)
- Optional information as to whether the simulation should run through a **recovery time** (i.e. a phase of run through which are not evaluated) before the process analysis, so that the simulation doesn't start "from zero", but from a random intermediate stage

Pre-Configured Process Analyses

You can get the five pre-configured process analyses

- For preparing an analysis: in the model browser using the `Model>Configuration>Process Analyses...` menu item
- For selecting an analysis to be executed: in the model browser and when selecting the process analysis environment via `Element>Properties...`.

Evaluating Probabilities

The process analysis called `probability` is analytical and determines, as initially outlined, the probabilities of achievements of activities and final states.

A prerequisite for this is that all conditional transitions which should run through with a probability < 1 were also featured with the desired probability. For more information, read chapter D-6.1.3, "Assigning Probabilities to Conditions", page D-157.

Evaluating Probabilities, Costs and Times

The process analysis called `Probabilities and Costs and Times` is analytical and determines the initially enumerated indicators for end states and activities.

A prerequisite of this is that the transitions are fully equipped with the desired probabilities and the activities and resources with their costs and times.

Simulations of Probabilities, Costs and Times

You will find three simulations, whose names have the following same design:

`Simulation <Distribution>/500/outgoing/prologue 2D`

- The parameters after the `<Distribution>` entry set the random distribution of incoming tasks–i.e.: Their time intervals–and are as follows:
  - `10m` stands for a constant distribution, i.e. a new task to be evaluated comes in exactly every 10 minutes.
  - `E(10m)` stands for an exponential distribution with an expected value of 10 minutes.
  - `"N(10m;5m)"` stands for an normal distribution with an expected value of 10 minutes and a standard deviation of 5 minutes.

Read chapter D-6.1.1, "Performance Indicators and Their Formats", page D-151 for an overview of distributions and notations.

- `500/outgoing` means that the simulation will be canceled after 500 processed run throughs.
- `prologue 2D` provides a simulation recovery time length of two days.

Read how to decide which of these pre-configured process analyses to use for tangible implementation in chapter D-6.3.3, "Removing or Restoring Columns in a Table", page D-168.

Note

If you only want to find out information about using pre-configured process analyses, please read chapter D-6.3.3, "Removing or Restoring Columns in a Table", page D-168.

D-6.3 Defining Your Own Process Analyses

The individual analysis parameters and procedures for defining your own process analyses are described in this chapter.

You require administrator rights to carry out all of these tasks. You do not need to read this chapter if you only work with existing or pre-configured process analyses.

Tcl Scripts for Process Analyses

There is a Tcl script behind each process analysis, which creates and updates analysis tables, as well as implements analytical and simulative process analyses. It is important: What precisely is evaluated and how different parameters are distributed in the script.

The Tcl script `anaev.tcl` is included in the scope of delivery as standard; the following section refers to this Tcl script.

D-6.3.1 Parameters for Analytical and Simulative Process Analyses

At least one of the following three parameters should be entered both for analytical and simulative process analyses:

- `-Probability`

  sets the probabilities named in chapter D-6.2, page D-163 to be calculated.
- `-Costs`

  sets the costs named in chapter D-6.2, page D-163 to be calculated; also implicitly sets the `-probability` parameter
- `-Time`

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sets the times named in chapter D-6.2, page D-163 to be calculated; also implicitly sets the `-probability` parameter

Additional Parameters for Simulative Process Analyses

The following parameters can and/or must be entered for simulations:

- `-Sim <Distribution>`

  shows that a simulative process analysis should be started. A distribution for arrival times of incoming tasks must be entered for `<Distribution>`, i.e. sets the random distribution which the intervals between two consecutive start events should comply to. You can find possible distributions in chapter D-6.1.1, page D-151.

- `time <Simulation Time>`

  is a possible reason for cancelation; this means that once the given (virtual) simulation time has expired, it should be stopped

- `count <Number of Tasks> incoming|outgoing`

  is a possible reason for cancelation; this means that once the simulation should be canceled once the given number or `incoming` or `outgoing` tasks is reached. i.e.: The choice `incoming` leaves an empty model at the end without tasks which need to be worked through there, whereas tasks are normally still being carried out for `outgoing`.

Note **One of the two cancelation criteria must always be given for simulations.**

- `prologue <Time|Amount>`

  sets that the simulation should not begin until after the first recovery time, i.e. process analysis commences once the given time has elapsed or the model has run the given number of tasks.

Note **The `-TOC` parameter for maintenance of an analysis table's so-called table of contents does exists (with the optional parameter `[replace]`), but is irrelevant, as in the `Element>Properties...` dialog box of a process analysis environment in the tab `Process Analyses`, group box `Table maintenance` the command `[Execute]` comes with the check box `Replace` command. If the check box is activated, the table's table of contents is completely deleted and then rebuilt; if the check box is not ticked, the table of contents remains and is only added to with missing entries. This is precisely the purpose of this parameter. For more information you can also read chapter D-6.4.4, page D-175 and chapter D-6.6.3, page D-179.**

D-6.3.2 Configuring User-Defined Process Analyses

If you want a combination of parameters listed in chapter D-6.3.1, page D-165, combine these in a process analysis.

You can find information about additional configuration options in chapter D-6.3.3, "Removing or Restoring Columns in a Table", page D-168.

How to proceed

To create a new process analysis:

» Jump to the model browser and select `Model>Configuration>Process Analyses...`.

» If applicable, go to the tab `Process Analyses`.
All existing process analyses are listed in the list box `Process analyses`.

» Select a process analysis–for convenience, one which is most similar to what you want to create–and change the name to the name of your new process analysis in the group box `Properties` in the field `Name`.
The `[Add]` button is activated.

» Select `[Add]`.
The new entry appears in the list box `Process analyses`.

» Select the new entry. Enter your desired analysis and simulation parameters in the field `Tcl parameters` in the group box `Properties`.

» Click on `[Change]`.

» Click on `[Apply]` and close the dialog box with `[OK]`.
The process analysis is created.

Note

Information about how to include your process analysis in the analysis table's `Edit>Process Analyses` menu can be found in chapter D-6.4.4, "Creating Lines and Columns (Maintaining Tables)", page D-175.

How to proceed

To delete a process analysis:

» Jump to the model browser and select `Model>Configuration>Process Analyses...`.

» If applicable, go to the tab `Process Analyses`.
All existing process analyses are listed in the list box `Process analyses`.

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» Select the process analysis which you want to delete and select [Delete].
The process analysis is deleted.

» Click on [Apply] and close the dialog box with [OK].
The process analysis is no longer available in the model. It also doesn't appear in the analysis table's Edit>Process Analyses menu. If necessary, you will need to maintain the table before carrying out a new analysis; this needs to be done if the existing table layout corresponds to the deleted process analysis.

D-6.3.3 Removing or Restoring Columns in a Table

To reduce the size of the table you need to remove the combination of nodes and attributes allowed which are responsible for the undesired columns or lines from the list box Mappings. You need administrator rights to do this.

Finding List Entries for a Column

You will recognize the list entry responsible for one of the columns to be removed as the **last** of its five values (attribute name) has the same name as the column.

Example: If you want to remove the Real Processing Costs table column, you need to delete the
Real node costs|costs|activity state|attribute|real processing costs
from the Illustration of Values list.

Note

Table lines are only deleted if all columns which can include values in these lines were deleted.

Removing Columns

Before deleting a list entry as described next, it is advisable to

- Mark which this was in the table of standard entries (see section "Pre-Configured Line Entries", page D-170)
- Or **save** the existing settings via Model>Configuration>Save Model Options....

How to proceed

To save the list entries:

» If necessary, jump to the model browser and select Model>Configuration>Save Model Options....
The dialog box of the same name appears.

» When making the save, assign a unique name, deactivate the check box `Export for process model` and then click on `[OK]`.

The save configuration can be loaded at any time. For more information, read page D-169.

How to proceed

To remove a table column:

» If necessary, jump to the model browser and select `Model>Configuration>Process Analyses...`.
The dialog box of the same name appears.
» If applicable, go to the tab `Value Mapping`.
» Select the entry responsible for the column in the list box `Mappings` and click on `[Delete]`.
The entry disappears from the list.
» Click on `[Apply]` and close the dialog box with `[OK]`.
» Table maintenance still needs to take place for the setting changes to take effect in the table. Proceed as described in chapter D-6.4.4, page D-175.
If you only open the analysis table, the column is removed.

Displaying Columns Again

You can restore an unwanted column's deleted list entry by

- Manually reconstructing the entry corresponding to the table from section "Pre-Configured Line Entries", page D-170

  or

- by **loading** the previous state if you saved the model option (see page D-168)

How to proceed

To load saved list entries:

» If necessary, jump to the model browser and select `Model>Configuration>Load Model Options...`.
The dialog box of the same name appears.
» Select your save from the drop-down list `Configuration file` and activate (at least) the check box `Process analyses`.
» Click on `[Apply]` and close the dialog box with `[Close]`.

The saved list entries are then restored.

Note

Ensure that there is no drop-down list for the first entry name when manually restoring, i.e. this needs to be entered manually.

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How to proceed

To manually include a column in the table again:

» If necessary, jump to the model browser and select `Model>Configuration>Process Analyses...`.
The dialog box of the same name appears.

» If applicable, go to the tab `Value Mapping`.

» Enter the desired five values which belong to the list entry which is responsible for the columns in the `Value` and `Target element` groups.

» Click on `[Add]`.
The entry appears in the Illustration list.

» Click on `[Apply]` and close the dialog box with `[OK]`.

» Table maintenance still needs to take place for the setting changes to take effect in the table: Proceed as described in chapter D-6.4.4, page D-175.
If you only open the analysis table, the column is available.

Pre-Configured Line Entries

You can use the following table to find out which line/column combinations can occur for analysis tables as standard:

VALUE			TARGET ELEMENT	
Name	**Type**	**Node type**	**Column kind**	**Attribute names**
Fixed node costs	Costs	Activity	Attribute	Fixed costs
Real node costs	Costs	Activity state	Attribute	Processing costs-real
Variation coefficient queue time	Standard deviation	Activity state	Attribute	Queue time variation
Variation coefficient processing time	Standard deviation	Activity state	Attribute	Processing time-variation
Variation coefficient process costs	Standard deviation	Activity state	Attribute	Process costs-variation
Real process costs	Costs	Activity state	Attribute	Processing costs-real
Real node time	Time	Activity state	Attribute	Processing time-real
Real processing time	Time	Activity state	Attribute	Processing time-real
Real processing time	Time	Final state	User-defined	Sum of processing time

VALUE			TARGET ELEMENT	
Name	**Type**	**Node type**	**Column kind**	**Attribute names**
Real process costs	Costs	Final state	User-defined	Sum of process costs
Pool Size	Integer	Object	Attribute	Number
Estimated service time	Time	Activity	Attribute	Estimated value of processing time
Resource costs per time unit	Costs	Object	Attribute	Variable costs
Probability	Probability	Final state	User-defined	P
Probability	Probability	Global condition	User-defined	P
Probability	Frequency	Activity state	Attribute	Relative frequency
Medial queue time	Time	Activity state	Attribute	Medial queue time

Loading Process Analyses

The contents described is part of a model template which forms the basis of your current model. If the model template is not one included in the scope of delivery, the table entries above could be missing from the appropriate dialog boxes. In this case, load process analyses from a model template included in the scope of delivery, as described in chapter A-2.3, "Loading Model Options", page A-31.

D-6.4 Preparing Process Analyses

Process analysis contains the diagram to be evaluated (or a sub hierarchy of various diagrams), as well as a table which the analysis information is stored in. The relationship between both is created using an assignment.

Carry out the following steps before starting the desired process analysis:

- Create a so-called **process analysis environment** which will be assigned to the diagram and analysis tables to be evaluated. This is normally done in the package where the diagram is also stored.
- Assign the process analysis environment to the diagram.
- Create a a so-called **diagram analysis table** in the process analysis environment. The performance indicators from the diagram are stored in this table, as well as the results determined from the analysis.
- You can use them to create suitable lines and columns for the diagram's table.

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- Transfer the performance indicators from the diagram to the table.

Analyzing Various Diagrams at the Same Time

You are aware that activity diagrams are probably already **refined**, i.e. another activity diagram can exist for an individual activity; this diagram describes the activity in greater detail.

If you use a relationship to join a diagram which has a refinement diagram to a diagram analysis table, only the diagram itself is analyzed–the refinement diagram, on the other hand, is not taken into account.

You also need to assign this refinement to the process analysis environment if you also want to incorporate the refinement diagram in the process analysis. By selecting the `Element>New>Process Analysis>Diagram Analysis Table` menu in the model browser, a table is created for each assigned diagram.

However, if you want to use a single table instead of a table for each diagram, create a so-called **environment analysis table** instead of a diagram analysis table. An environment analysis table can take information from various diagrams and process it. The preparation process itself is identical in both cases.

D-6.4.1 Creating Process Analysis Environments

A process analysis environment makes up the framework for an activity diagram to be evaluated and a table which contains the diagram information and analysis results. Various diagrams and tables can exist per process analysis environment.

How to proceed

To create a process analysis environment:

» Select the package which contains the diagram to be evaluated or another suitable package.

» Select `Element>New>Process Analysis>Environment`.
The process analysis environment appears in the package.

» Select the process analysis environment and select `Element>Properties...`.
The dialog box of the same name appears.

» If applicable, go to the tab `Name`.

» Enter a name for the environment in the field `Name` and click on `[OK]`.
the process analysis environment is renamed.

D-6.4.2 Assigning Diagrams to Process Analysis Environments

If you created a process analysis environment, assign the activity diagram which you want to analyze to it, i.e. create references to the diagrams in the environment. You can assign various environments to a diagram and/or various diagrams to an environment.

How to proceed

To assign an activity diagram (not including its refinements) to a process analysis environment:

» Select the diagram in the model browser and select `Engineering>Assign to...`.
The dialog box of the same name appears.
» If applicable, go to the tab `Process Analysis Environment`.
» Select the desired process analysis environment in the drop-down list `Name`.
or
» Click on `[Select]`. In this case, proceed as described in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.
» Click on `[Assign]`.
» Close the dialog box with `[Close]`.
The diagram is assigned to the environment.

How to proceed

To assign an activity diagram (including its refinements) to a process analysis environment:

» If applicable, jump to the model browser.
» Select the activity diagram and all its refinement diagrams. (Use the [Ctrl] key to select more than one diagram at the same time.)
» Select `Engineering>Assign to...`.
The dialog box of the same name appears.
» If applicable, go to the tab `Process Analysis Environment`.
» Select the desired process analysis environment in the drop-down list `Name`.
or
» Click on `[Select]`. In this case, proceed as described in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.
» Click on `[Assign]`.

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» Close the dialog box with [Close].
The diagram and its refinements are assigned to the environment.

How to proceed

To assign another and/or further process analysis environment to a diagram:

» Select the diagram, lock it and select Engineering>Assign to....
The dialog box of the same name appears.
» If applicable, go to the tab Process Analysis Environment.
» Select the desired environment in the drop-down list Name.
or
» Click on [Select]. In the last case, proceed as described in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.
» Click on [Assign].
» Close the dialog box with [Close].
The environment was assigned to the diagram.

How to proceed

To remove assignment of a diagram or process analysis environment:

» Select the diagram or the environment in the model browser's detail view and lock the selected element.
» Select Edit>Remove Reference.
The assignment is removed.

D-6.4.3 Creating an Analysis Table

If you assigned the diagram which is to be evaluated to the process analysis environment, you still need a **diagram analysis table** (for a single diagram) or an **environment analysis table** (for various diagrams), which contains the information necessary for process analysis and where all results will be entered after successful process analysis. The activity diagram's performance indicators to be analyzed can be

- Automatically transferred in the table (see chapter D-6.4.5, "Transferring Performance Indicators in the Table", page D-176)
- or manually entered into the table.

The procedure for creating a table is made up of two steps:

- Creating the table in the model browser (without lines and columns)
- Creating lines and columns (corresponding to the diagram) in the table

How to proceed

To create diagram analysis tables or an environment analysis table:

» Select the process analysis environment in the model browser and select `Element>New>Process Analysis>Diagram Analysis Table` or `Environment Analysis Table`.
In the first case, enter the name of the respective diagram in the diagram analysis tables, whereas in the second case, the environment analysis table which should include information about various diagrams is assigned the name of the process analysis environment. If necessary, modify the table name via `Element>Properties...`.

To open the table, click in the model browser as usual on the icon in front of the table name.

D-6.4.4 Creating Lines and Columns (Maintaining Tables)

In this phase, you will set the table to exist without lines and columns and so that it is only an extremely small square. To create the table's shape, you need to inform the process analysis environment of which process analysis you want to carry out:

How to proceed

To create the line and column entries in the analysis table:

» Select the process analysis environment and select `Element>Properties...`.
The dialog box of the same name appears.
» If applicable, go to the tab `Process Analyses`.
» Select the desired process analysis in the list box `Process analyses` and move it to the list box `Selected` by clicking on `[»»]`.
» If more than one entry is available, select the one you require.
» Click on `[Apply]`.
The `[Execute]` command is activated.
» In the group box `Table maintenance`, click on `[Execute]`.
If you deactivate the check box `Replace`, old entries which form a table which already exist remain and only the missing entries are inserted. If you activate the check box, the table is created as new and, therefore, smaller.
» Close the dialog box with `[OK]`.
If the diagram analysis table is open, you will see that the table only contains lines and columns which correspond to the diagram elements and their attributes.

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Note **You can find all information about the topic table maintenance in chapter D-6.6.3, "Digression Table Maintenance", page D-179.**

D-6.4.5 Transferring Performance Indicators in the Table

In this phase, the table still doesn't contain contents which can be analyzed. You only need to update the table's contents to transfer stored performance indicators in the table into the diagram.

How to proceed

To transfer the performance indicators from the activity diagram to the analysis table:

» Open the table if necessary.

» Select `Edit>Load Attribute Values`.
The values from the diagram appear in the appropriate cells in the table.

Manually Entering Performance Indicators in the Table

Instead of transferring performance indicators from the activity diagram, you can also enter them individually directly into the analysis table.

How to proceed

To manually enter performance indicators in the table

» Open the table if necessary.
Not all cells in the table are active and can be manipulated. You will recognize this as the cells are colored if you select them: If this is not the case, you cannot enter performance indicators in them. (For more information read chapter D-6.6.3, "Digression Table Maintenance", page D-179.)

» If the cell can be manipulated, select it and select `Edit>Properties...`.
The dialog box of the same name appears.

» Enter the desired size in the field `Cell value` or select it from the drop-down list of the same name.

» Close the dialog box with `[OK]`.
The table value was changed accordingly.

You can now carry out a new process analysis with the modified values (see page D-177).

Transferring Manual Table Modification into the Activity Diagram

You also have the option to transfer your manual modification in the activity diagram. To do this, select

- Individual cells or
- Lines and/or columns

Which should be transferred. If you do not select anything, the entire table contents is transferred.

How to proceed

To transfer table values in the respective activity diagram:

» Make a selection in the table, as described above.

» Select `Edit>Save Results`.
The desired performance indicators are transferred to the corresponding model elements in the diagram.

Note

Manual modifications in an analysis table only have an effect in the table if the above steps are not taken. Implementation of process analyses for various values can be greatly facilitated, as you don't have to jump to the diagram first to make the changes and then update the values in the table. It is also possible to carry out user analyses on users who might not even have access to the diagrams belonging to the table.

This is the last preliminary work which needs to be carried out and the process analysis can now be carried out. For more information, read chapter D-6.5, "Implementing Process Analyses", page D-177.

D-6.5 Implementing Process Analyses

To be able to implement a process analysis, an appropriate analysis table must exist which contains the performance indicators from the activity diagram which you want to analyze. Read how to create this table in chapter D-6.4.3, "Creating an Analysis Table", page D-174.

You also need to have chosen a process analysis. For more information, read chapter D-6.4.4, "Creating Lines and Columns (Maintaining Tables)", page D-175.

Note

If you want to carry out a process analysis which has already been implemented immediately after making a change in the underlying activity diagram, please read chapter D-6.6, "Repeating Process Analyses after Diagram Changes", page D-178 first.

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If you have fulfilled the prerequisites already specified, you can then start the process analysis. The results appear as new values entered in the analysis table.

How to proceed

To carry out a process analysis:

» Open the analysis table if necessary.

» Select `Edit>Process Analyses><Process Analysis>`.
The process analysis is carried out and the determined values appear in color in the table.

D-6.6 Repeating Process Analyses after Diagram Changes

changes to the diagram mean that you need to repeat one or more of the preparation steps; this is because not only the table values, but the lines and columns in the analysis table need to be altered too. The steps necessary to repeat depend on the extent of the changes made.

D-6.6.1 If only performance indicators were changed

If only the values of probabilities etc. were changed in the activity diagram and the diagram structure was not altered, then only the performance indicators need to be updated in the table.

How to proceed

To update the performance indicators in the table:

» If necessary, jump to the analysis table and select `Edit>Load Attribute Values`.
The modified performance indicators appear in the table and the process analysis can be started again (see section "Implementing Process Analyses", page D-177).

D-6.6.2 If Diagram Elements were Changed

If you changed not only performance indicators, but also removed, inserted or changed model elements such as transitions or activities, updating the performance indicators is not sufficient, as the table structure–line and column entries–also normally needs to be adjusted.

How to proceed

To repeat a process analysis after making modifications to diagram elements:

» If applicable, jump to the analysis table.

» Select `Engineering>Adjust Table`.
The lines and columns are adjusted to the diagram modification.

» To import performance indicators, select `Edit>Load Attribute Values`.
The table is now in the updated shape and contains the performance indicators from the modified diagram which have also been updated if appropriate.

You can now carry out process analysis as described in chapter D-6.5, page D-177.

D-6.6.3 Digression Table Maintenance

There is a considerable difference between the `Engineering>Adjust Table` command in the analysis table and the `[Execute]` command in the process analysis environment (see chapter D-6.4.4, "Creating Lines and Columns (Maintaining Tables)", page D-175), even if the effect appears identical on the surface: The table contains the lines and columns assigned to the diagram. To comprehend the difference (and, in doing so, also which situation requires which command), the following will describe how table maintenance is internally handled.

Illustration of Values

If you select the `Model>Configuration>Process Analyses...` command in the model browser, as you have already done when defining your own process analysis, another tab appears called `Value Mapping`. This contains a list of entries, each of which is made up of five elements of the following design:

Name | type | note type (= value) +

Column kind | attribute name (= target element)

"Value" stands for a node in the modeled process (activity or object) and "target element" stands for an attribute for the node. i.e.: These entries in the list set which combination of nodes and attributes makes sense and then

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- Which lines and columns need to be created in the table, as well as
- Which cells can include a performance indicator in the table.

As not all attributes make sense for a node, cells which are inactive also exist in the analysis table.

Effect of Table Maintenance

If you only select the `[Execute]` command when maintaining the process analysis environment's table, the following occurs: Innovator processes the list above internally and creates all combinations listed there in the table if relevant ones occur in the diagram. The table is, thereby, created completely from scratch. (If the check box `Replace` is deactivated: only missing entries are supplemented.)

Adjusting `Contents Comparison`

The `Engineering>Adjust Table` table command, on the other hand, also accesses this list, but only compares it to the diagram, i.e. adds missing lines and columns in the table and removes all table entries which were not included after the list had been worked through. This is why execution of this command always comes with the warning that lines and columns could be deleted.

In more technical words, the difference can be described in such a way: If applicable, maintenance of the table modifies the table's table of contents, whereas `Engineering>Adjust Table`, on the other hand, adjusts the table to the table of contents. (After each table maintenance, the `Engineering>Adjust Table` menu item is automatically carried out.)

If Table Maintenance is Necessary

Two situations in which you should carry out table maintenance will be described next:

- If you want to carry out another process analysis as previously described (see section "If the Selected Process Analysis was Changed", page D-180)
- If you want to remove lines or columns from the analysis table, which serve no purpose in your analysis (see section "Removing or Restoring Columns in a Table", page D-168)

D-6.6.4 If the Selected Process Analysis was Changed

If you want to skip to another process analysis from the same activity diagram, you normally have to adjust the lines and columns in the analysis table as well. In this case, proceed as described in chapter D-6.3.3, page D-168, and in particular, chapter D-6.4.4, page D-175.

D-7 Setting the Use of Elements in the Configuration Model

Models which you create in the Innovator Business edition are normally based on a pre-configured reference model which provides the most important diagram and element types; the so-called configuration model. In this way, you can use all diagrams without needing to spend a long time configuring them yourself.

However, if you have special requirements for your model's structure, these pre-configured elements may not be sufficient. The following chapter describes how you can configure your model yourself, i.e. how to create and modify a configuration model.

Classification

The following chapter solely applies to the configuration steps which are possible and/or necessary in conjunction with your model's diagrams.

- Class and state diagrams are only used in the configuration model. Read how to configure classes, states and their diagrams for this in chapter A-4, "Storing Specifications for Diagrams and Elements", page A-73.
- Read how to configure users and their rights in chapter A-1, "Managing Users, Groups and Rights", page A-3.
- Read how to allocate other stereotypes etc. in chapter A-4.1, "Defining Stereotypes and Properties of Elements", page A-75.
- Read how to change your model's package structure in chapter A-3, "Structuring Models with Packages", page A-35.

The Edition's Configurable Elements

The following elements in the Innovator Business edition edition need to be prepared before use in the configuration model:

- In the activity diagram:
  - The diagram itself
  - Activities
  - Objects (such as products, resources, events)
  - Relationships between activities and objects
- In the object diagram:
  - The diagram itself
  - Objects (such as products, resources, events)
  - Activities
  - Relationships between objects and/or activities

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- In the use case diagram:
  - Actors
- In the sequence and collaboration diagrams:
  - The diagram itself
  - Objects

Constraint Various information needs to be stored in the configuration model to be able to create a model element in the Innovator Business edition edition. The most important **exceptions** are:

- In the business use case diagram:
  - **Use case diagram**: at least one template needs to be configured for business use case diagrams (see page A-99). Use case diagrams also need to be permissible in the package (see page A-60).
  - **Use case**: at least one template needs to be configured for business use casess (see page A-91): Use cases also need to be permissible in the package (see page A-60).
  - **System**: A package with the system's name already needs to exist in the model to be able to create a system in the business use case diagram at a later stage (see page A-37).
- **State diagram**: at least one template needs to be configured for state diagrams (see page A-99). Use case diagrams also need to be permissible in the package (see page A-60).

D-7.1 General Information about Configuring Diagrams and Elements

There is a wide array of options available to you when changing your model's configuration. You will only normally need to use a tiny fraction of these options. However, if you create a completely empty model (i.e. a reference model doesn't form the basis), you need to carry out each of the following steps:

- Activity, sequence, collaboration and object diagrams can be created by configuring **subtypes** and, in doing so, create the corresponding submenus in the model browser's `Element>New Diagram` menu (see page D-186).
- Set how the diagrams should be structured for objects, activities and actors in the model browser's `Element>New Diagram` menu. This can be carried out in three steps:
  - Create classes for objects, activities and actors (see page D-187).
  - Create another menu level, the topic menu, if needed (see page D-192).

  - Set which configured diagram types these created classes should be able to appear in and which menus they should be displayed in (see page D-192).
- Set what objects, activities and actors of a certain type should look like, as well as which relationships should exist between these elements (see page D-195).
- Classes which form the basis of objects, activities and actors can contain properties (attributes). These attributes are always of a certain type. Set which types exist for attributes in your model (see page D-209).

Note

You can partly choose the order in which you carry out these steps. You can also e.g.

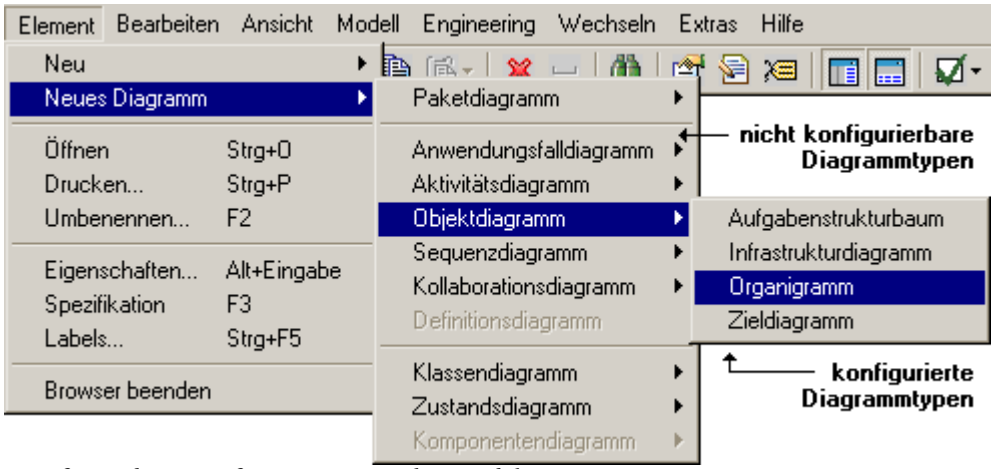
- **Create classes first**
- **Then create packages for configured diagram types and topic menus**
- **Permit classes in the various diagrams**

Configuring Diagram Types

To be able to create such diagrams, you need to configure further types for the following diagram types:

- Activity diagram
- Object diagram
- Sequence diagram
- Collaboration diagram

Configuration of these types primarily influences the `Element>New Diagram` menu in the **model browser**:



Configured Types of Diagrams in the Model Browser

The `Element>New Diagram` menu and entries about the diagram types (here, `Object Diagram`) are always included in the model browser. These cannot be changed.

The next level (here, `Task assignment diagram` etc.) is made up of **configured diagram types**, which you can use to further subdivide the diagrams of a type depending on their purpose. You can use packages of a certain stereotype to create these (see page D-192).

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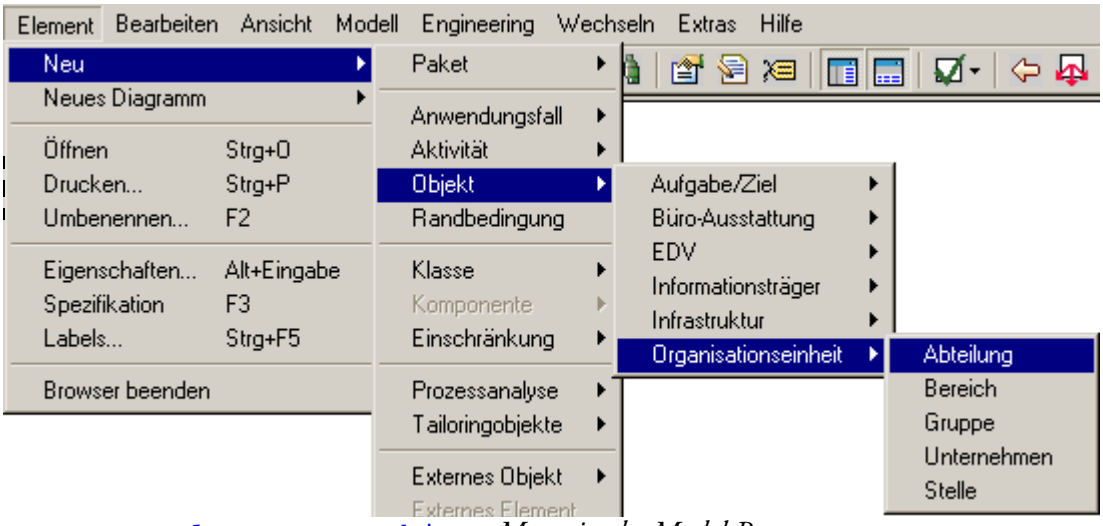
Configuring Activities and Objects

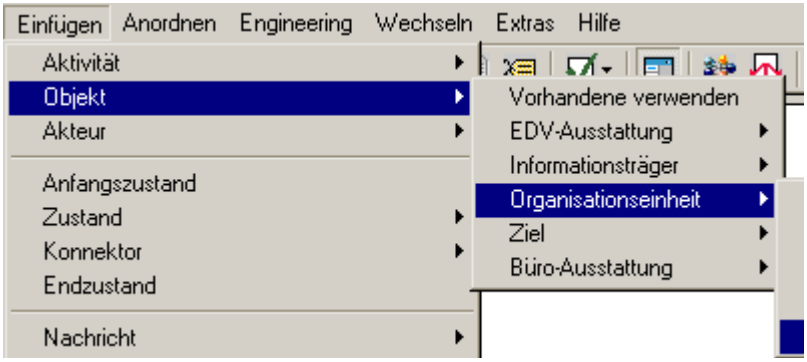
You can create **activities** and **objects** in both the model browser and in diagrams. You can influence the configuration using the `Element>New>Activity` or `Element>New>Object` menu:

- `Element>New` **menu in the model browser**: You can create classes which you prepare for activities or objects in certain packages. This assignment is displayed in the menu.



`Element>New>Object` *Menu in the Model Browser*

- `Insert` **menu in the diagram**: It depends which classes should be installed for the respective element type (element types are e.g. activities or objects) from the configured diagram type.



`Insert>Object` Menu in the Diagram

You can also insert other menu levels–topic menus– in diagrams if needed (see page D-185).

Classes for activities which have the «activity type» stereotype (see page D-193).

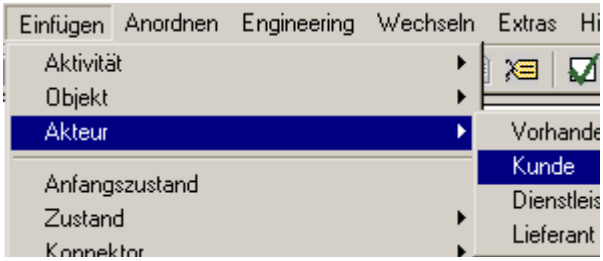
Classes for objects can have–with few exceptions–any stereotype (see page D-193).

Configuring Actors

Actors can only be created in diagrams. Create classes for actors in the configuration. Then set which classes are permissible for actors in each configured diagram type.

You can also insert other menu levels–topic menus– in diagrams if needed (see page D-185).

Depending on the classes, actors which already exist can be used or new ones created.



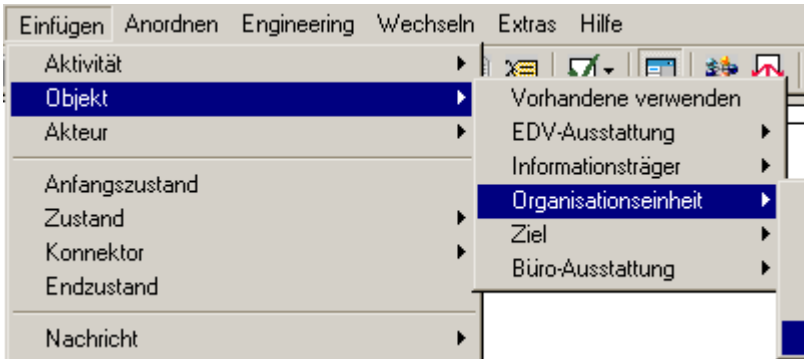
`Insert>Actor` *Menu in the Diagram*

To be able to create actors, set which classes are permissible for actors in each configured diagram type.

Classes for actors have the «actor» stereotype (see page D-193).

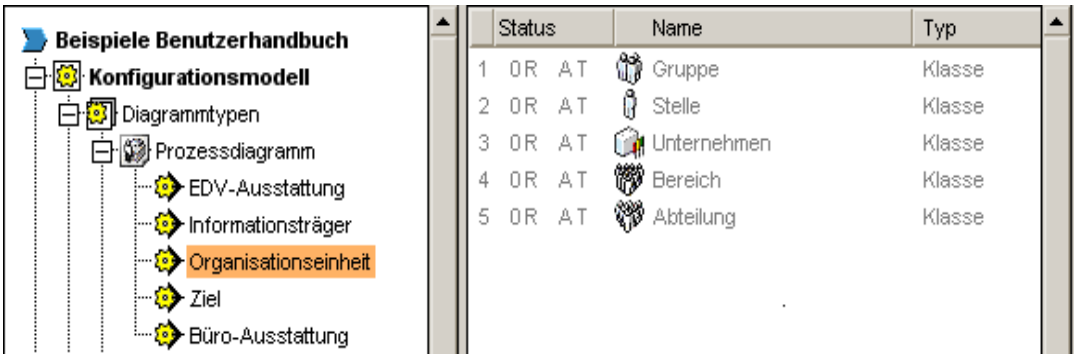
Expanding the Menu to Include Topic Menus

If the menu levels which are created in the diagrams by the classes are not sufficient for grouping elements, you can insert another menu level–the topic menu–under these.



`Insert>Object` *Menu with the Topic Menu*

You can create topic menus using son packages below the packages for configured diagram types. They have the «configuration menu» stereotype (see page D-192).



`Process Diagram` *Diagram Type in the Configuration Model with Five Topic Menus*

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D-7.2 Enabling Creation Diagrams

You can use various diagrams in the Innovator Business edition to specify the structure and flows within your company.

You can configure further subtypes for the following diagram types to obtain the greatest possible creative freedom:

- Activity diagram
- Sequence diagram
- Collaboration diagram
- Object diagram

In a later step for each of these configured types, set which elements can be created in diagrams of this configured type (see page D-192).

Configure various types of diagrams by creating a package with certain properties for each one.

On the other hand, you need diagram templates for class, state and use case diagrams (see chapter A-4.3.5, "Creating and Changing Diagram Templates", page A-99).

D-7.2.1 Preparing Parent Packages for Configured Diagram Types

A package with a specific stereotype must exist for each configured diagram type which you want to prepare in the model. All of these packages need to be stored in a common parent package of the «configuration diagrams» stereotype.

Note **No more than one package of the «configuration diagrams» stereotype can exist in a model. You can have any name and parent package for this package.**

How to proceed

To create a common, central parent package for configured diagram types:

» Jump to the model browser and check whether a package from the «configuration diagrams» stereotype already exists. For more information, read chapter B-3, "Searching for Information", page B-81. If such a package doesn't already exist, create one.

All packages which you create under this parent package are exclusively reserved for defining configured diagram types and their contents.

D-7.2.2 Configuring Diagram Types

A submenu containing the name of the package appears for each package which you create in the following way in the `Element>New Diagram><Diagram Type>` menu in the model browser.

How to proceed

To enable diagram creation of a certain configured type in the current model:

» If necessary, jump to the model browser and open the package which is reserved for defining configured diagram types (see chapter D-7.2.1, "Preparing Parent Packages for Configured Diagram Types", page D-186).

» Create a new package (see page A-37).

» Rename the new package and assign it one of the following stereotypes (see page A-39):

- For **object diagrams**, the «configuration objects» stereotype
- For **activity diagrams**, the «configuration process» stereotype
- For **sequence diagrams**, the «configuration sequence» stereotype
- For **collaboration diagrams**, the «configuration collaboration» stereotype

A further submenu with the name of the new package is now offered under the entries for the diagram types in the model browser's `Element>New Diagram` menu.

Renaming Configured Diagram Types

You enable a configured diagram type with the name of each package which you create with the stereotypes mentioned above. When you rename this package, you also rename this diagram subtype.

D-7.3 Preparing Classes for Elements

You can only use certain element types in the diagrams, e.g.

- In the object diagram: Objects and activities
- In the activity diagram: Objects, activities, actors and events
- In the use case diagram: Actors, use cases and systems

You cannot influence which element types are permissible in a specific diagram type. However, you can set which classes of objects, activities and actors can be used in your model's **configured** diagram types. To do this, create a class with specific properties for each type of object, activity and actor; assign them to the configured diagram type.

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To be able to insert an element in a diagram of a configured type, at least one base class needs to exist in the model.

However, you will normally require various types of objects and activities, e.g.

- **Activity**
  - Manual workstep
  - IT-supported workstep
  - Automated workstep
- **Object**
  - Document
  - Job
  - Task
- **Actor**
  - Customer
  - Supplier

For a class for an object, an actor or an activity, set this class using the stereotype.

Reserved Class Stereotypes

Use a class stereotype to set which element can be created from this class at a later stage:

Element	Stereotype
Activity	«activity type»
Actor	«actor»
Events/messages	«signal»

You can use all stereotypes for creating classes for objects, **except** the ones mentioned above.

Note

Classes whose `is Abstract` property (not stereotype) has the `yes` value cannot be instantiated. This means that menus for activities, objects etc. can never be created from such classes.
The `Type Code` property also needs to be assigned to the `inotk_class` value. The property's other values are reserved for classes which specify an attribute's type and the attribute value's format.

Sticking with the above example:

- You need three classes for activities which have the «activity type» stereotype. Enter the names `Manual Workstep`, `IT-Supported Workstep` and `Automated Workstep` for these classes.

- You need three classes for objects. These classes have the «class» stereotype as standard. You can also, however, assign other–if applicable, user-defined–stereotypes, e.g.

«entity»	For products
«resources»	For resources
«orgunit»	for organizational units

  You can only enter one name which specifies the element for each of these classes, e.g. for the organizational units' (precisely: the classes with the `orgunit` stereotype) names, such as `Division`, `Department`, `Team`.
- You need two classes for activities which have the «actor» stereotype. Enter the names `Customer` and `Supplier` for these classes.

Note

At least one class template needs to be configured in a model to be able to create a class. For more information, read chapter A-4.3.2, "Creating Packages for Model Elements and Packages", page A-91.

Planning the Menu Structure

You can store the classes which you create for elements in any of your model's packages. However, using one single package (e.g. called `Types`) for this is recommended. You can also use other son packages to sensibly group classes, e.g. `organizational unitsone`, `actors`, `work steps` etc.

Note

You can also create activities and objects in the model browser. As a second menu level, all packages which contain classes with the stereotype for activities («activity type») or with the stereotype for objects are displayed.

Example

You need the following classes for activities:

- `Manual workstep`
- `Automated workstep`
- `IT-supported workstep`

As well as the following classes for objects:

- `Division`
- `Department`
- `Job`

This means that your package structure then has the following effect on the menu structure in the model browser:

- If you set all your classes in the `Types` package, in the **model browser**, you get the menus
  - `Element>New>Activity>Types>Manual Workstep` etc.
  - `Element>New>Object>Types>Division` etc.

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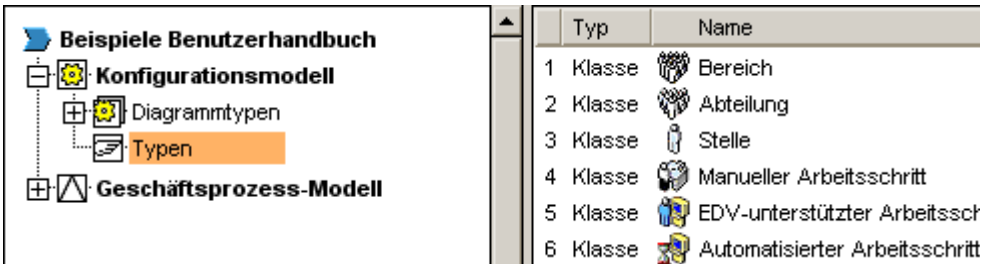
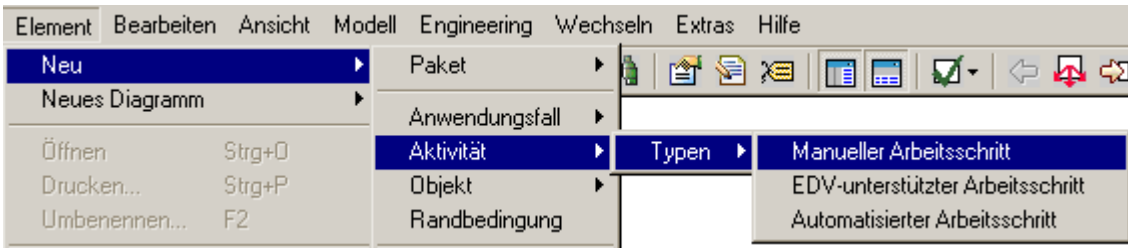
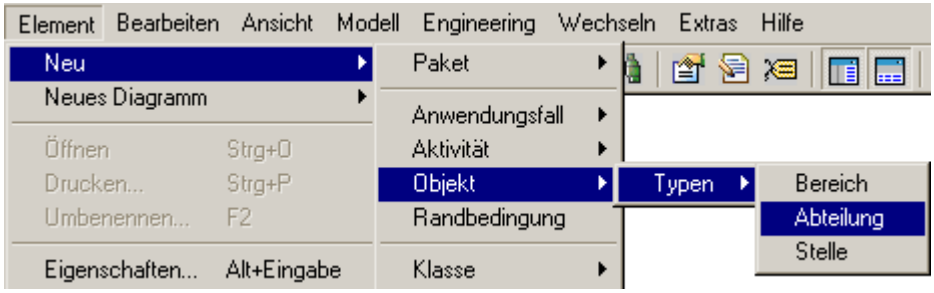


View of the `Types` *Package in the Model Browser*



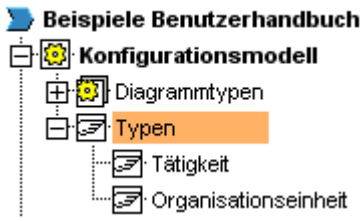
`Element>New>Activity` *Menu*



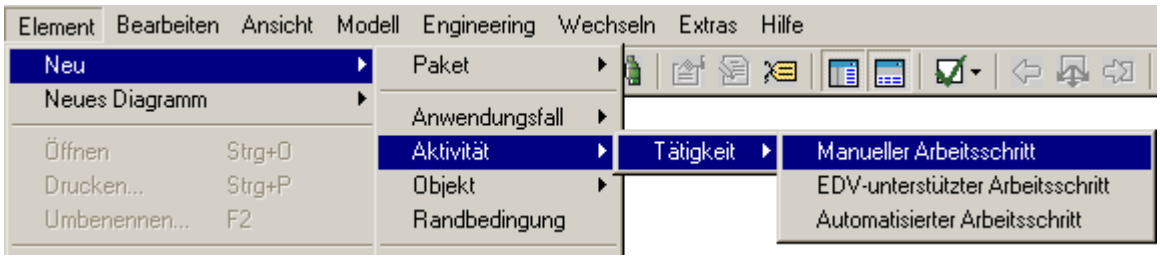
`Element>New>Object` *Menu*

If all classes are stored in a package, the name (here: types) is displayed in the corresponding `Element>New` menu.

- If, on the other hand, you split the classes from the packages `Task` for activities and `Organizational Unit` for objects, in the **model browser**, you get e.g.
  - `Element>New>Activity>Task>It-Supported Workstep` etc.
  - `Element>New>Object>Organizational Unit>Department` etc.



View of the Packages Under the `Types` *Package which Contains the Configuration Classes for Objects*



`Element>New>Activity` *Menu*

`Element>New>Object` *Menu*

If the classes are in various packages, their names are shown in the `Element>New` menu.

Creating Classes

Each class which you create in the following way can be included in another step in the `Element>New` menu.

How to proceed

To create classes for objects, activities and actors in the current model and, in doing so, enable them to be created:

» Jump to the model browser and create the package where you want to store the classes.

» Ensure that at least one class template is configured for the model (see page A-91).

» Create the classes for all activities, objects and actors which you need for your model.

» Rename the new classes and assign them one of the following stereotypes:

- For **activities**, the «activity type» stereotype
- For **events**, the «signal» stereotype
- For **actors**, the «actor» stereotype
- For **objects**, another suitable stereotype

Read chapter D-7.4, "Organizing the Insert Menu in Diagrams", page D-192 to find out how to use new classes as menu items in object and/or activity diagrams.

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D-7.4 Organizing the Insert Menu in Diagrams

If you have configured some diagram types (see chapter D-7.2, page D-186) and provided classes for your model's elements (see chapter D-7.3, page D-187), you can then set in a further step how the respective `Insert` menu should be structured in the various diagram types. This can be carried out in two steps:

- Set which level of the `Insert` menu you want to group the elements to, i.e. whether you want to insert a topic menu or not.

  To do this, create a package with a special property for every submenu (see page D-192).
- Set which type of objects, activities and actors should be offered in which menu level.

  To do this, reference the classes which should appear in the submenu in each package for configured diagram types or topic menus (see page D-193).

You will find the submenus `Activity`, `Object`, `Actor` in the `Insert` menu for the majority of diagrams.
The following examples show how to create the following menu levels, `<Topic Menu>><Activity Class>`, `<Topic Menu>><Object Class>` or `<Topic Menu>><Actor Class>`

D-7.4.1 Creating Topic Menus for Elements

You can further subdivide the *`Insert`* menu in diagrams by creating a menu level with topic menus.

You can define and add your own topic menus to each of the diagram types which you configured in chapter D-7.2, "Enabling Creation Diagrams", page D-186.

How to proceed

To be offered another submenu, `<Topic Menu>`, in a diagram in the `Insert` menu:

» Jump to the model browser and mark the configured diagram type's package («configuration process», «configuration objects», «configuration sequence» or «configuration collaboration» stereotype).

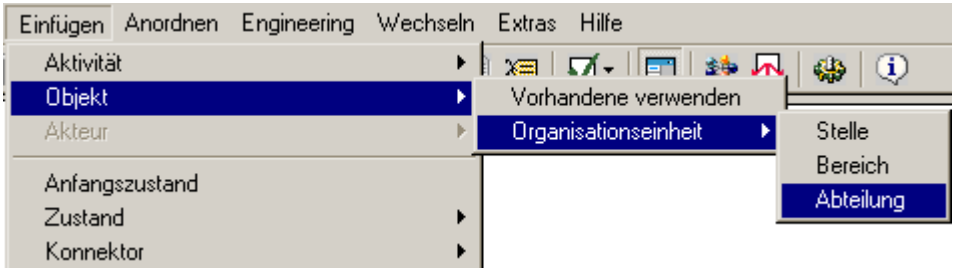
» Create a new package (see page A-37).

» Rename the new package (the name of the topic menu) and assign it the stereotype «configuration menu» (see page A-39):

If you then assign the desired classes to the new package as references (see page D-193), all diagrams of the appropriate configured diagram type are offered a submenu with the name of the new package in the `Insert` menu.

D-7.4.2 Offering Activities, Objects and Actors in Menus

If you have prepared packages for diagram subtypes (see page D-187) and, if necessary created topic menus (see page D-192), you can fill the corresponding `Element>New` or `Element>New Diagram` menus in the model browser and the `Insert` menu in the diagrams with the actual entries. Assign the desired classes to the packages for the menus.



If a Class is Assigned to a Package for Diagram Types or Topic Menus, they Appear in the Appropriate Diagram's `Insert` Menu

The following prerequisites must be met for this:

- Packages from the «configuration menu», «configuration objects», «configuration sequence», «configuration collaboration» and «configuration process» stereotypes can be referenced in the current model classes (see page D-194).
- A class exists for each type of objects, activities and actors (see page D-187).

If you create elements in a diagram of a configured type using the menus which are already available, in doing so, you create instances of the corresponding class in the Innovator model. These instances in turn, represent the same subtypes of the `Insert` menu's last level in diagrams.

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Note

Due to the class stereotype, Innovator recognizes which submenu of `Element>New` (in the model browser) or *`Insert`* (in the diagram editor) the entries should be displayed in at a later stage. This means that

- **Classes from the «activity type» stereotype always appear in the `Activity` sub menu**
- **Classes from the «actor» stereotype always appear in the `Actor` submenu**
- **Classes from the «signal» stereotype always appear in the `Message` sub menu**
- **Classes from other stereotypes always appear in the `Object` submenu**

as menu items.

Abstract classes (irrespective of which stereotype) and those which are intended as attribute types (their `type code` property therefore has a different value `inotk_class`) never appear in the `Element>New` or `Insert` menu.

Permitting Classes in the Package

A property of packages is which elements are created within them (owning packages) and which elements should be referenced within them (reference packages).

You need to reference the desired classes in the appropriate package to obtain entries for activities, objects or actors in your diagram's `Insert` menu (see page D-194). Packages for menus in Innovator are therefore always reference packages. Please ensure that reference packages with the «configuration menu», «configuration objects», «configuration sequence», «configuration collaboration» or «configuration process» stereotypes can also reference classes in the current model. Read how to ensure that classes are permissible in the menu packages in chapter A-3.4.1, "Setting Permissible Elements", page A-60.

Creating Menus for Elements

You can obtain the entries in the `Insert` menu which you use to create objects, activities or actors by assigning the appropriate package (if applicable, for topic menus) to the desired classes.

How to proceed

To obtain entries for creating activities, actors and objects in the menu:

» Jump to the model browser.

» Ensure that classes can also be referenced in packages with the «configuration process», «configuration objects», «configuration sequence», «configuration collaboration» and «configuration menu» stereotypes (see page D-194).

» Select one of the packages which you have stored classes for objects, activities or actors in (see page D-187).

» Select the classes which you want to arrange in the diagram under one of the `Insert` menu's submenus.

» Select `Edit>Create Reference in...`.
The dialog box of the same name appears.
Read how to work in this dialog box in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» Close the dialog box with `[OK]`.
The classes are now also displayed in the package for the diagram subtype or its topic menu. Entries for activities, objects or actors whose classes are referenced in the corresponding package can now by found in the `Insert`– menu or, if applicable, under the topic menu in the subtype's diagrams.

D-7.5 Setting Terminology, Properties and Relationships of Elements (Class Diagrams)

If you have configured your own diagram types and set up the *`Insert`* menu in the diagrams, as described in the previous chapters, you can already begin to display most of the information in the diagrams.

- Create objects, activities and actors of various types
- Place these elements in relation to each other or display state transitions
- Display which events have an influence on the process

In the configuration model, you can already set, however, how the elements are individually used in the diagrams.

Defining Terminology

You have already set types for activities, objects etc. using class names. You use terminology for this which is used within your company.

You can also define further terminology from your system for class names.

- Properties (attributes) which differentiate the elements from each other
  This means that you can e.g. specify whether employees in your company have a "personal number" or an "employee identification".
- Relationships between elements
  - Equal relationships (associations)
    e.g. "carries out" or "is responsible for"
  - "Consists of" relationship (aggregations)
    e.g. "Files" are made up of "documents" or "groups" are made up of "employees"
- State transitions which are activated by activities
  e.g. "conceptual design", "under review", "approved"

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Specifying Element Appearance

Classes are displayed as rectangles in class diagrams as standard; they show the name and, if applicable, the class' stereotype. You can specify an icon which should be displayed instead for each individual class. If an element is created from this class at a later stage, it is also automatically given this display as default. This default setting can be changed individually for every element.

Assigning Attributes

You can set which elements should have which properties in the configuration model. Each respective element which is then created in the model will have these properties.

Note

You can set whether the attributes should really be shown later in activity or object diagrams individually for each element.

Setting Relationships

In activity and object diagrams, place elements in relation to each other using relationships. You can either manually rename all these relationships or set which elements can have which relationships in the class diagram. This relationship is then suggested in later diagrams.

Prerequisites

Templates need to exist to create class diagrams and be able to work in them. At least the following templates are required:

- A template for a class diagram (see page A-99)
- A template for a class (see page A-91)
- A template for attributes (see page A-91)
- A template each for associations, aggregations and generalizations (see page A-93)

If you want to assign attributes to your classes, enter which type this attribute is from for each one respectively. The attribute types from the UML are already available in the reference model included within the scope of delivery. If you require additional attribute types (e.g. "currency", "date", "time"), you need to define these yourself (see page D-209).

D-7.5.1 Creating Class Diagrams

You can set the elements' terminology, relationships and properties in class diagrams. You can use any number of class diagrams to model certain aspects in a targeted manner.

Creating Class Diagrams

You create class diagrams with the model browser. The following prerequisites must be met:

- At least one diagram template for class diagrams exists in the model. Corresponding entries are not available in the menu `Element>New Diagram>Class Diagram` until then (see page A-99).
- Class diagrams are defined as permissible elements in the package in which you want to create the diagram (see page A-60).

If templates are prepared, creating class diagrams is no different from creating other diagrams in the Innovator Business edition edition. Read about this in chapter B-2.2.2, "Creating and Opening Diagrams", page B-34.

Other Information

- chapter B-2.3.1, "Changing Names, Relationships and Declarations", page B-49
- chapter B-2.2.1, "Enabling Creating with Dialog Boxes", page B-34
- chapter B-4, "Working in Diagrams or Tables", page B-99

D-7.5.2 Adding Classes in Class Diagrams

Create the classes for all activities, objects and actors which you need for your model (see page D-187). Only classes which are added in the diagram are displayed in a class diagram.

Adding Classes

You can decide whether you only want to make this classes visible or whether all relationships of this class should also be transferred into other diagrams in the current diagram. Read what to be aware of when adding elements in chapter B-2.1.2, "Logical and Graphic Existences of Model Elements", page B-22.

Note

You can also use diagram properties to set whether other classes which already have a relationship to it should be added when adding a class (implicit add). For more information, read section "Setting the Maintenance Status of Elements", page A-107.

How to proceed

If you want to add a class to your current diagram:

» If necessary, lock the current diagram.
You will get a preselection of classes which you can add using the selection in the current diagram:
  - If you do not make a selection, all classes which are not displayed in the current diagram are offered.
  - If you select a class, all classes which contain at least one of the relationships which are not displayed for the selected class are offered.

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- If you select a relationship, all classes which are involved with the relationship are offered.

» Select the element which you want to use to make the preselection or click on a free point in the diagram.

» Select `Insert>Class>Add Existing...`.

The dialog box of the same name appears. Read how to work in this dialog box in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

The selected classes are inserted in the diagram. The class which was selected first is inserted at the marked position; the others are then positioned as standard.

Making Additional Relationships Visible

You can also make the class' relationships which additional classes have in other diagrams visible at a later stage. All classes which are linked with the class are added to the current diagram. Read what to be aware of with the maintenance status in chapter B-2.1.3, "Displaying Relationships to Model Elements from Other Diagrams (Maintenance Status)", page B-24. Read how to change the maintenance status on page B-27.

D-7.5.3 Influencing Class Appearance

Classes are shown as rectangles as standard. The following information is shown in this rectangle–as long as the appropriate settings were made:

- The stereotype (in double angle brackets)
- The name
- If applicable, the icon
- The list of attributes

You can make the following settings to influence how classes are displayed:

- Showing/hiding stereotypes: Make this setting for the entire class diagram (see page D-199).
- Setting icons (see page D-199)
- Only showing classes as icons (see page D-199)
- Showing/hiding attribute lists (see page D-201)

Note **The settings which you make for influencing how classes are displayed do not affect how the corresponding elements are displayed later in object or activity diagrams.**

How to proceed

The class diagram must be locked during all of the following tasks:

» Lock the diagram.

Showing/Hiding Class Stereotypes

You can set whether a class' (and the diagram's other elements) stereotype should be shown or not for the entire model. The stereotype value is shown as standard.

How to proceed

To hide the stereotype:

» Click on a free point in the diagram and select `View>Display Options...`.
The dialog box of the same name appears. A check box is offered for each possible element type in the group box `Stereotype display`.

» Deactivate the check box `Class` and close the dialog box with `[OK]`.
The class is shown without stereotypes.

Setting a Class' Icon

You can set which icon should be displayed for each individual class. The objects/activities which are created from the class can be identified later by this icon. It can, however, be replaced by another one.

How to proceed

To assign another icon to a class:

» Select the class whose icons you want to modify and lock it as well.

» Select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Icon`.

» Select a bitmap file from the drop-down list `Icon`
or

» Click on `[Select]`.
The dialog box of the same name appears. All bitmaps are shown which are stored in the `$INODIR/icons/default` directory.

» If necessary, look through the icons using the path buttons. Select the required icon and close the dialog box with `[OK]`.
Both the file name and the icon are displayed.

» Also close the dialog box `Edit/Properties` with `[OK]`.
The new icon is shown in the class.

Only Showing Classes as Icons

For each class, you can individually set whether it should be shown as a rectangle (with the desired information) or as an icon. You can also specify whether the name (and, if applicable, the stereotype) of the class should be positioned on this icon.

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Note **If you only want to display the class as an icon you can no longer display attributes. The attribute list is hidden. You can no longer create attributes.**

How to proceed

To only display a class as an icon:

» Select the class and lock it.

» Select `View>Display Options...`.
The dialog box of the same name appears.

» Select the tab `Class`.

» Activate the check box `Icon only` in the group box `Show icon also` and click on `[Apply]`.

» To change the position of the name, select tab `Icon Display`.
The icon currently set is shown in the group box `Text alignment when icon only`. There is a radio button for every position where the class' designation can be shown.

» Activate the radio button with the position you want to assign to the class' designation and close the dialog box with `[OK]`.
The class is no longer shown as a rectangle, but as its icon.

D-7.5.4 Creating Attributes

To be able to distinguish more exactly between objects, activities and actors of various types, assign properties (attributes) to their classes. If you make instances of the class in a diagram at a later stage, enter the attributes of the respective values required.

For each attribute, individually set which object and references of objects a later attribute value should refer to (see page D-202).

You can only assign attributes to a class in a class diagram.

Showing/Hiding Attribute Lists

You can individually show and hide the attribute lists for each class. The attribute lists needs to be shown before you can create an attribute.

Note **If a class should only be displayed as an icon, its attribute list is automatically hidden. You cannot show the list when it is in this state.**

How to proceed

To show a class' attribute list:

» If necessary, lock the diagram.

» Select the class and lock it.

» Select View>Display Options....
The dialog box of the same name appears.

» Select the tab Class.

» Ensure that the check box Icon only is deactivated.

» Select the tab Attribute.

» Activate the check box Show compartment and close the dialog box with [OK].
The class is shown as a rectangle. The class is split by a line below its name. If attributes are already assigned to it, these are displayed in the lower section of the class.

Creating Attributes

An attribute template needs to exist before you can create an attribute (see chapter A-4.3.2, page A-91). An attribute's properties and how it is displayed depend on this template.

How to proceed

To create an attribute in a class:

» Select the class which you want to create an attribute for and lock it as well. If this class already has attributes, select the attribute which the new attribute to be inserted after.

» Select Insert>Attribute><Attribute Template>.
The new attribute is created and, if applicable, placed in the class on the marked position.

Modifying Attributes

If you create an attribute, it gets the designation and properties provided in the attribute template. You can also change an attribute at a later time. You can make the following changes:

- Rename the attribute
- Change the type of attribute
- You can change the properties (e.g. validity range)

Note

You can also change more than one attribute at the same time. However, you can only change their properties, not their names and type.

How to proceed

If you want to change an individual attribute:

» If necessary, lock the diagram.

» Select the class which contains the attribute and lock it. Ensure that the class' attribute list is not hidden (see page D-200).

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» Select the attribute.

» Select Edit>Properties....

The dialog box of the same name appears. This box is divided into various sub-areas:

- Define the name and type of the attribute in the group box Declaration. All permissible attribute types are listed in the list box Select as input assistance for the types. Read how to define other attribute types in chapter D-7.5.6, page D-209.
- Assign values of the properties to the attribute in the group box Element properties.

An attribute's declaration is normally made up of its name and type, separated by a colon.

» Enter the attribute's name in the text box Declaration.

» To set the attribute's type, enter it–after a colon–directly in the text box Declaration or click on the desired type in the list box Select.

The type is inserted at the insertion point.

Assign the desired properties to the attribute using the entries in the group box Element properties. Read how to change properties at a later stage in chapter A-4.1.1, "Expanding, Modifying and Deleting Properties", page A-76.

» Select a property in the column Name. Check whether the correct value is in the column Value.

All possible values which can have the property are shown in the appropriate selection or entry cell in the column Value. The entry cell is activated for any value range.

» If you want to change the value of the property, select the desired value in the selection cell in the column Value or–for any value ranges–enter a value in the entry cell.

» Enter all properties in this way.

» Finally, close the dialog box with [OK].

The attribute is changed.

Setting an Attribute's Validity Range

For each attribute, individually set which objects or references of objects an attribute value entered later should refer to.

- All objects which are assigned to the current class have the same attribute value.
- All references of an individual object have the same attribute value.
- Each individual reference can have its own attribute value.

For attributes which need to have the same value for all objects of the class, enter this value in the class diagram in the attribute's declaration.

How to proceed

To specify an attribute's validity range:

» If necessary, lock the diagram.

» Select the class which contains the attribute and lock it. Ensure that the class' attribute list is not hidden (see page D-200).

» Select the attribute and select `Edit>Properties...`.

» Select the `Gültigkeitsbereich` entry in the column `Name`.
All possible values which can have the property are shown in the selection cell in the column `Value`.
- Attributes which should always have the same values for all the class' objects need to have the `classifier` property value.
- Attributes which should always have identical values for all an object's references need to have the `instance` property value.
- Attributes which can vary its values for an object's individual references need to have the `reference` property value.

» If you want to change the property's value, select the desired value from the drop-down list in the column `Value`.
If you have selected the `classifier` validity range, enter this value directly in the attribute. All objects which are created from the class are automatically given this attribute value.

» Enter a real equals sign (`=`) at the end of the attribute declaration and then the value in the `classifier` validity range.

» Finally, close the dialog box with `[OK]`.
The attribute is changed.

Storing Information for Later Users

For some attributes, you may want to ensure that values which are assigned to the attribute at a later stage are entered in a certain format. You can give the users information about which form the attribute value is expected in, e.g. `dd.mm.yyyy` for date specification. It is then shown in the dialog box which attribute values are assigned to. This information is a property of the type of attribute, i.e. the class which makes the basis of the attribute.

How to proceed

To give information to later users about which format the attribute value is expected:

» Select–in the model browser or in a class diagram–the class which is defined as type of an attribute and lock it.

» Select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the `Format` entry in the column `Name`.

» Enter the required information in the entry cell in the column `Value`.

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You can set a tangible entry instruction using a regular expression for attributes with the `tk_string` type code; this will then be verified when applying the changes in the model.

How to proceed

To set which expression an entry needs to correspond to for the attribute value with the `tk_string` for users later:

» Select the `Expression` entry in the column `Name`.

» Enter the regular expression in the entry cell in the column `Value`. The example shows a regular expression for a name entry with an optional academic title.

```
^(Prof. |Dr. )*(([a-z]+ |[dl]' )?[A-ZÄÖÜ][a-zäöüß]+(-| )?)+(, [A-ZÄÖÜ](\
.|[a-zäöüß]+)((-| )[A-ZÄÖÜ](\.|[a-zäöüß]+))*)?$
```

» Finally, close the dialog box with `[OK]`.

Hiding the Attribute's Type

For each individual class, you can set whether its attributes are only shown with its name or also with its type. The entire declaration (i.e. name and type) is shown as standard.

How to proceed

To hide the type:

» If necessary, lock the diagram.

» Select the class and lock it as well.

» Select `View>Display Options...`.
The dialog box of the same name appears.

» Select the tab `Attribute`.

» To show only the name and not the type, select the `Name` entry in the drop-down list `Declaration`.

» Close the dialog box with `[OK]`.
The type is hidden for all the class' attributes.

D-7.5.5 Creating Relationships Between Classes

If you have already prepared classes for objects, activities and actors (as described in chapter D-7.3, page D-187), you can create corresponding elements in the diagrams and link theses with desired relationships. You can set possible relationships between elements in the configuration model. These relationships are then suggested in diagrams.

You can create the following relationships between classes:

- **Inheritance:** To display the inheritance of attributes between classes, use the generalization.
- **Relationship:** Set which relationships exist between instances of classes involved using associations and aggregations. Which stereotype the classes are from is important (here, the «class» stereotype stands for all stereotypes, apart from the reserved stereotypes, see page D-188):
  - «class» - «activity type» (object -activity): Only in activity diagrams (e.g. "creates" or "is responsible for")
  - «class» - «class» (object - object): Only in object diagrams (e.g. "consists of" or "controls")
- **Dependency:** You can define dependencies between elements of any type using this relationship type.

If you have specified precisely one relationship between two classes in the configuration model, this specification is suggested–when making an appropriate selection in a diagram at a later stage–as standard when creating a relationship. If there is more than one possible relationship for the marked element in the configuration model, all of the ones in the diagram are offered for selection.

Provisions for Simulation

When carrying out simulations at a later stage (see page D-149), you can set whether attributes of objects should be taken into consideration in the simulation. You can activate this using a special property of associations of the respective classes (see page D-208).

Creating Relationships

At least one relationship template needs to exist for each type of relationship which you want to create in the class model (see page A-93).

You can find general information about relationships in chapter B-2.2.7, "Creating and Changing Relationships", page B-42.

How to proceed

To create relationships between classes in the class diagram:

» Lock the diagram.
  The order in which you select classes determines the direction of the hierarchical and directed relationships. Associations can travel in any direction.

» Select the classes which you want to create a relationship between:
  - **For generalizations:** Select the one bequeathing the inheritance first and then all the inheriting ones.
  - **For aggregations:** Select the top class first and then all subclasses.
  - **For dependencies:** Select the class which is dependent first and then the one which the first one is dependent on.

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» Select `Insert><Relationship>><Relationship Template>`.
The relationship is created.

Other Information

- Read how to redirect a relationship to another class in section "Linking Segments", page B-44.

Renaming Relationships

The name which was specified in the relationship template is given to a newly created relationship. You can change this name.

Note

For associations and aggregations, you can enter not only the entire relationship to the name, but also individual association ends.

If you create a relationship of the classes involved here between instances in a diagram at a later stage, the relationship's name is offered as a suggestion.

How to proceed

To rename a relationship:

» Lock the diagram.
The relationship selection points are shown.
» Select the relationship's selection point which you want to rename and select `Edit>Properties...`.
The dialog box of the same name appears.
» Enter the name of the new relationship in the field `Name` and close the dialog box with `[OK]`.
The relationship is renamed.

Changing Multiplicity

For associations and aggregations, enter how many objects of the respective class are involved or can be involved in the relationship at the end of the association.

How to proceed

To change the multiplicity of an association end:

» Lock the diagram.
The relationship selection points are shown.
» Select the relationship's association end which has the multiplicity you want to enter and select `Edit>Properties...`.
The dialog box of the same name appears. The tab with the name of the class is displayed; this also shows the association end.

» Enter the name of the role which you want to specify the multiplicity for in the field `Name`.
» Select the `Multiplizität` entry in the column `Name`.
The current value is shown in the column `Value`.
» Select another value from the selection cell or enter one in the entry cell.
» Click on `[Apply]`.
» Enter the desired multiplicity for all association ends in all tabs in the same way.
» Finally, close the dialog box with `[OK]`.

Changing the Type of Relationship

As long as no more than two classes are involved in a relationship (two-structured relationship), you can choose between association, aggregation, generalization and dependency for the type of relationship.

If, on the other hand, more than two classes are involved in a relationship (multi-structured relationship), you can only choose between aggregation, dependency and generalization; you can also only choose between these as long as the dependency's parent class or target class are identical.

How to proceed

To change a two-structured relationship's type:

» Lock the diagram.
The relationship selection points are shown.
» Select the following association end for the relationship.
- **For the target types generalization and aggregation:** Select the association end which should point to the parent class' generalization.
- **For the target type dependency:** Select the association end which should point to the class which the other one is dependent on.
- **For the target type association:** Select any association end.
» Select `Edit>Properties...`.
The dialog box of the same name appears.
» Select the tab `Type`.
» Activate the junction which you want to change the type of relationship for in the group box `Switch to` and close the dialog box with `[OK]`.
The relationship type is changed. For generalizations, aggregations or dependencies, the selected association end points to the dependency's parent class or target class.

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How to proceed

To change a multi-structured relationship between an aggregation, generalization or dependency:

» Lock the diagram.
The relationship selection points are shown.
» Select the association end which points to the dependency's parent class or target class and select `Edit>Properties...`.
The dialog box of the same name appears.
» Select the tab `Type`.
» Activate the junction which you want to change the type of relationship for in the group box `Switch to` and close the dialog box with `[OK]`.
The relationship type is changed. The selected association end points to the dependency's parent class or target class.

Changing the Dependency's Direction

You can also change the direction of a dependency's arrow at a later time.

How to proceed

To reverse the direction of the dependency:

» Lock the diagram.
The relationship selection points are shown.
» Select the relationship's association end which should be the dependency's target and select `Edit>Properties...`.
The dialog box of the same name appears.
» Select the tab `Type`.
The option button `Dependency` is activated.
» Leave all settings and close the dialog box with `[OK]`.
The dependency's direction is reversed.

Incorporating Objects in the Simulation

Only activities are incorporated in simulations as standard. If you also want objects which are assigned to activities as resources to be incorporated, set this in the class diagram. Assign the `Resource for Simulation yes` property to the association between the activity's class and the object's class.

How to proceed

To also incorporate objects' attributes for later simulations:

» Lock the diagram.
The relationship selection points are shown.

» In the diagram, if applicable, add the classes for activities and objects which should be incorporated in the simulation and create an association.
» Select the association's selection point and select `Edit>Properties...`.
  The dialog box of the same name appears.
» Select the tab `Association`.
» Select the `Resource for Simulation` entry in the column `Name` entry in the group box `Element properties` and click on `yes` in the selection cell in the column `Value`.
» Close the dialog box with `[OK]`.
  Objects of the class are now incorporated into the simulation.

D-7.5.6 Creating Attribute Types Activities, Objects and Actors

You can assign attributes to classes in your configuration model. Each of these attributes has a type. Attribute types which are provided in the UML metamodel have already been prepared. However, you can define further attribute types for your model. To do this, create a class of a certain stereotype for each attribute type.

At least one class template needs to exist in your model to be able to create a class (see page A-91).

How to proceed

To prepare a new attribute type for your model:

» Jump to the model browser and, if necessary, open the package where you want to add the classes for attribute types.
» Ensure that at least one class template is configured for the model (see page A-99).
» Create the classes for all attribute types which you need in your model.
» Rename the new classes and assign them the stereotype «basic».
  The class' name is offered as an attribute type later.

D-7.6 Setting Possible States for the Element (State Diagram)

An object can have various states throughout its existence. Changing between these states is activated by events. All of a class' objects react to the same events with the same state changes.

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You can already set which classes can have which states and which events will activate these states during your model's configuration. make these specifications in the state diagram.

Example

If one of your company's processes should be examined (this should be done when commencing documentation), you can e.g. define the following states for the `Offer` class:

- In conceptual design
- Under inspection
- Released

As events, you can set e.g. `Submitted for inspection` (for the document's change of state from `In conceptual design` to `Under inspection`) and `Inspection carried out` (for change of state to `Released`).

Note

Theoretically, you can create a state diagram for each of your model's classes. However, as a recommendation, only classes which are relevant for business process modeling should be described in state diagrams.

States which are set to a class in the state diagram are offered as a selection for objects of this class in the Innovator Business edition edition's diagrams. These can also be extended there by others.

Actions are connected with the arrival of an event. They can be carried out within a state, both during the state change via a transition and when accepting an event within a state.

Elements of State Diagrams

You can use the following elements in the state diagram:

- Model elements
  - Regular state
  - Initial state
  - Final state
  - Container
- Transitions
  - Basic transition
  - Conditional branches
  - Parallelism

D-7.6.1 Creating and Changing State Diagrams

You can use the state diagram to specify which conditions should determine which state a class (or its objects) should have and which events lead to a change of state. You need a class before you can create a state diagram.

A can also resolve assignment of a state diagram to a class or assign it to another class.

Note

You can only create state diagrams if templates for this element type are stored in the model. Read about this in chapter A-4.3.5, "Creating and Changing Diagram Templates", page A-99. State diagrams also need to be permissible in the package which the diagram is stored in.

You can create a state diagram from a class diagram or from the model browser. A state diagram is normally assigned to a class. It can also be activated from an assignment.

If you create a state diagram using a class diagram, the state diagram is automatically assigned to a class. You can change or completely resolve this assignment at a later time.

Other Information

- chapter B-2.2.2, "Creating and Opening Diagrams", page B-34
- chapter B-4, "Working in Diagrams or Tables", page B-99
- section "Renaming Elements–General", page B-50

How to proceed

To create a state diagram for a class:

» Open the class diagram with the classes which you want to create a state diagram for.

or

» Open the package in the model browser which contains the desired class.

All diagram templates which exist in state diagrams in the model are listed in the `Element>New Diagram>State Diagram` menu.

» Select the class and select `Engineering>Create State Diagram><Configured Type>`.

The state diagram is created and–as long as you have created it from the class diagram–opens.

Opening State Diagrams

Open an existing state diagram either via the model browser or the class diagram with the assigned class.

If no classes are assigned to the state diagram, you can only open this using the model browser.

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How to proceed

To open an assigned state diagram from the **model browser**:

» Open the package which contains the state diagram.

» Select the diagram which you want to open and select `Element>Open`.
The state diagram is opened.

How to proceed

To open an assigned state diagram from the **class diagram**:

» Open the class diagram with the classes which you want to open a state diagram for.

» Select the class which the desired diagram is assigned to and select `Jump>Reference...`.
The dialog box of the same name appears. An entry `state diagram` is shown in the column `Element type` for each state diagram.

» Select the `state diagram` entry in the column `Element type`.

» Click on the name of the diagram which you want to open in the column `Name` and close the dialog box with `[Jump]`.
The state diagram is opened.

Changing the Assignment

You can change the assignment of a state diagram yourself in the model browser or state diagram.

How to proceed

To change the assignment:

» Jump to the model browser and select the state diagram.

» Lock the diagram.

» Select `Engineering>Assign to...`.
The dialog box of the same name appears.

» If applicable, select the tab `Class`.
All classes which are already available in the model are listed in the drop-down list `Name`.

» Select the classes in the drop-down list `Name` which you want to assign to the state diagram.

or

» Click on `[Select]`.
The dialog box `Choose Item` appears. Read how to work in this dialog box in chapter B-2.6.7, "Using Standard Dialog Boxes for Selecting Elements", page B-74.

» Click on [Assign] in the dialog box Engineering/Assign to and close the dialog box with [Close].
The state diagram is assigned to the selected class.

Resolving Assignments

If you resolve the assignment of a state diagram to a class, you can only open it using the model browser.

How to proceed

To resolve the assignment of a state diagram to a class:

» Select the state diagram whose assignment you want to resolve in the model browser and lock it.
» Select Engineering>Assign to....
The dialog box of the same name appears.
» Select the tab Class.
The class which the state diagram is currently assigned to is shown in the drop-down list Name.
» Click on [Remove] and close the dialog box with [Close].

Read how to assign a state diagram which has not yet been assigned to a class in section "Changing the Assignment", page D-212.

D-7.6.2 Working with a State Diagram's Elements

You can use the following elements in the state diagram:

Regular State

You can use a regular state to display that the class (or its objects) is paused in a state for a certain period of time until an event arrives which moves it to the next state.

The response of an object to an arriving event can include an action and/or a state change.

In the state diagram, regular states are shown as slightly rounded rectangles. Their names are offered later in the dynamic model's diagrams for selection.

A state can contain other states (container state).

Initial State

An initial state is shown as a small circle, which can be labeled as an option.

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Final State

A final state is shown as a circle with an inner core. It can be labeled to distinguish final conditions. The reaching of the final state represents the completion of the activities in the surrounding region and ends the life of an object.

Other Information

- chapter B-2.2.4, "Creating Model Elements", page B-37
- section "Renaming Model Elements", page B-52
- chapter B-2.5, "Removing and Deleting Elements", page B-61
- chapter D-7.6.4, "Working with Transitions", page D-215

D-7.6.3 Refining States (Container)

You can graphically subdivide a state and, in doing so, refine it. To do this you use the container state. It contains any number of states.

Creating Containers

A state is shown as a rectangle with rounded corners. It can have both a name and one or more states.

The states in the container take up the container's free area–provided that the container is large enough. Refinement diagrams now occur within a state.

You have two options when creating a container state:

A: Create an empty container state and insert the other desired elements. Read how to create an empty container state in chapter B-2.2.4, "Creating Model Elements", page B-37.

B: Convert a regular state into a container state.

How to proceed

To create a container state from a regular state:

» Lock the state diagram.

» Select the regular state which you want to convert and select `Edit> Properties...`.
The dialog box of the same name appears.

» Activate the check box `Container`.

» Close the dialog box with `[OK]`.
The state is shown as a container state. It is not a filled shape. You can enter where further elements should be positioned within the rectangle. All elements which are within the container frame are assigned to the container.

» Now create all elements which you want to assign to the container. Make sure you set their position within the container.

» If elements are already outside of the container and you want to bring them in at a later stage, simply move the elements within the container's frames. If necessary, enlarge the container.

» To move the container and all the elements within it, move the mouse pointer close to the frame within the container until it becomes a double arrow. Now move the container to the desired place.

D-7.6.4 Working with Transitions

A transition is a state change that can be caused by an event. The transition is illustrated in the form of a closed, directed line. The arrow points from the current state to the target state.

A condition for the transition can be entered in square brackets.

You can use the following variations of transitions:

- Basic transition
- Parallelism

Permissible Conditions for Transitions

Transitions cannot run between states. A transition needs to fulfill the following conditions to be permissible. The following points need to be taken into consideration when creating, joining and making new connections for transitions.

- An initial state is always a transition's source; it cannot have more than one outgoing transition and cannot be involved in a junction.
- A final state is always the transition's target and cannot have outgoing transitions.

Creating and Changing Transitions

You can use transitions to show the changes between states. You can enter one (for recursive transitions) or two states.

A basic transition is shown as an arrow between states. The states need to already exist to be able to create a transition. If all prerequisites are fulfilled (see page D-215), create transitions as all directed relationships in Innovator (see page B-43).

You can change the following specifications for transitions:

- Condition, action (see page D-215)
- Reversing the direction of the arrow (see page D-216)
- Changing the target or source state (see page D-216)

The diagram must be locked during all of the following tasks.

Other Information

- chapter B-2.5, "Removing and Deleting Elements", page B-61

Changing Transitions

You can enter a condition and/or an action.

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How to proceed

To change a transition:

» Select the transition which you want to change and select Edit>Properties....
The dialog box of the same name appears:
- Formulate the condition which the state change arrives in in the tab Condition. Read about conditional branches on page D-217.
- If applicable, set which actions are to be carried out in the tab Action.

» Select the desired tab, select a condition of an action from the drop-down list Name or enter a new entry in the field Name.

» Close the dialog box with [OK].

Reversing the Direction

you can reverse the direction of the transition.

How to proceed

To reverse the direction of the transition:

» Select the transition and select Edit>Reconnect>Invert.
The direction is reversed.

Changing the Source

You can enter another source for a transition at a later stage. The following constraints need to be taken into consideration:

- The new state cannot already be a transition's output state.
- If the transition flows into a branched transition, the selected state cannot be involved in the same branched transition.

How to proceed

If you want to assign another source for a transition:

» Select the state which should be the new source for the transition.

» Then select the transition which you want to transfer and select Edit>Reconnect>Source.
The state is assigned to the transition as the output state.

Changing the Target

You can enter another target for a transition at a later stage. The following constraints need to be taken into consideration:

- The new target state cannot be the transition's target state yet.
- If the transition runs from a branched transition, the new state cannot be involved in the same branched transition.

- The transition's target state cannot be a branched transition.

How to proceed

If you want to assign another target for a transition:

» Select the state which should be the new target for the transition.

» Then select the transition which you want to transfer and select `Edit> Reconnect>Target`.
The state is assigned to the transition as the target state.

Branching Out Transitions

Parallel flows start and end with a bar, which all branches of parallel transitions branch off from. If the parallel branches are merged, these are also released with a bar.

Precisely one transition flows into a parallelism start and at least two transitions lead out of it.

at least two transitions flow into a parallelism end and precisely one transitions lead out of it.

The procedure is always the same when working with branches.

How to proceed

The diagram must be locked and the element selected during all of the following tasks:

» If necessary, lock the diagram.

Creating Branches

You need to incorporate at least three states when creating a branch.

The position where the branch begins or ends is identified by a fork.

Proceed as you would for a normal transition when creating a branch, but instead of selecting a state involved, select the fork instead.

Note

Forks are only used within container states in accordance with UML. Whether this applies or not is not checked during creation. You can, however, set whether the fork is used in your diagram using an Innovator verify option.

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How to proceed

To create a branch:

» If necessary, click on the position where the element should be inserted for the branch and select the desired element in the `Insert>State` menu.
The fork is shown as a vertical bar. Read how to horizontally position the fork bar in section "Rotating the Fork Bar", page D-218.

» Between the state, create the starting point which should be the branch and a transition's fork.

» Create a transition between the fork and two or more target states.
Read how to set whether the branches should wait for each other before moving on at the end of the fork or not in section "Setting Up Conditions for the End of the Fork", page D-218.

» Enter the condition which the branch should be carried out in for each branch.

» To re-merge the branches, create another branch element (as described above) and link the branches with this element.

Rotating the Fork Bar

A fork's bar is created as a vertical bar as standard. You can rotate it 90°.

How to proceed

To rotate the fork bar:

» Select the fork bar and select `Edit>Properties...`.
The dialog box of the same name appears.

» Select the tab `Alignment`.

» Activate the desired junction in the group box `Alignment` and close the dialog box with `[OK]`.
The bar is shown as rotated.

Setting Up Conditions for the End of the Fork

You can set whether branches which flow into a fork should wait for each other or not:

- All states of all inflowing branches which exist before the AND join need to be completed so that the state can be entered after the fork.
- It is sufficient for the parallel branches to be completed for the OR join. The second branch won't be waited for.

Branches which run into a fork are linked with the AND join as standard.

How to proceed

To complete the fork with an AND or a OR join:

» Select the fork bar and select `Edit>Properties...`.
The dialog box of the same name appears.

» Activate the desired radio button in the group box `Type` and close the dialog box with `[OK]`.
The bar does not change when the `Parallel split` and `AND join` radio buttons are activated. The text `OR` is added in curly brackets for option button `OR join`.

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D-8 What to do When Something Doesn't Work (Troubleshooting)

This chapter deals with Innovator's various behavior patterns which users with little experience find hard to class when starting their work. The most important information which you, as a pure user (i.e. without administrator rights), should know about the topic "configuration" will also be conveyed.

There are other alternatives available to you if this information does not help for a tangible problem:

- Other sections in the available **manual**; the index can be particularly helpful
- Innovator's **Online Help**; you can access it using the `Help>Online Help` menu item
- The onsite **administrator** who configured your business process model or is responsible for configuration queries
- The **FAQs** (Frequently Asked Questions) on MID GmbH's internet page (`http://www.mid.de`)

If these options cannot help you, the MID hotline is available to you:

Tel.: +49 (0)911 96836-22
Fax: +49 (0)911 96836-10
E-mail: support@mid.de

Most Commonly Forgotten Things

Even right at the beginning when starting your work with Innovator it is possible that you might **forget to lock** the affected environment and/or element before a menu item.

A way to remember this: "LOCKING HELPS!"

For more information, read chapter B-2.1.4, "Reserving Elements for Editing (Locking)", page B-28.

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D-8.1 What You Should Know about Configuration

To be able to preemptively answer the questions in the chapter headings: **Nothing really**–apart from a so-called configuration model which you do with Innovator during business process modeling exists as a basis for helping you with your work.

How the Configuration Draws Attention to itself

Create diagrams and diagram elements within a model in the Innovator Business edition edition.

- Which diagram and element types are used in the model
- Which rules apply within the diagram for using model elements

Are set for this. All this information is stored in the model browser in the subtree called `Configuration Model`; this is of no interest for you as a user. Maintenance of this configuration model always falls to the administrator who is responsible for your model.

If you carry out menu items such as `Element>Properties...`, `Element>New><Element Type>` or `Engineering>Verify Modeling`, Innovator always uses the configuration model and reacts accordingly to the configuration set up there. Unexpected behavior patterns can stem from these settings. The following sections contain examples about this.

Other Information

- chapter D-7, "Setting the Use of Elements in the Configuration Model", page D-181

D-8.2 If Innovator Does Not Permit Element Insertion

Two variants are distinguished between here:

- The element is not available in the `Element>New|New Diagram` and/or `Insert` menu or is not activated (grayed out)
- The element can be selected in the `Insert` menu but this leads to an error message

If the Element is Not Offered in the Menu

This explains the problem: Creating the element you want **doesn't make sense or is not provided** in the current situation and/or environment and is therefore not permitted by Innovator. Typical examples of this are:

- You want to insert an element in a diagram which is not permissible in diagrams of this type.
- You want to create a diagram which requires so-called templates for being created. If these templates are missing then use of the diagram is probably not permitted when configuring models.

Another possible cause is that **necessary prerequisites** for the creation are missing. Therefore e.g. insertion of a relationship between two model elements is only offered if you have actually selected two model elements. You can find the prerequisites which need to be individually fulfilled when inserting an element in the relevant manual chapter for the element affected.

It is also conceivable that an element in the tangible situation which may make theoretical sense was not taken into consideration in the **configuration model**. In this case, you need to need to discuss this with your administrator and, if necessary, configure it.

Finally, the problem can simply be due to the fact that you have **not locked** the environment which you are working in (package or diagram) and/or the model elements affected by the creation.

If Inserting Objects in the Diagram Leads to an Error Message

Which type elements which are created in a package of this type can be from is set for each package type. If you violate this setting, this will first become apparent after you have given the insertion command. You then have two options for reacting to the message:

- Create the element in another suitable package which is not subject to this restriction.
- Ask your administrator to include the desired element type in the list allowed in the package or to create a new suitable package.

D-8.3 If you Cannot Find Entries in the Model Browser or Menus

The entries in the model browser and the `Element>New` menu automatically adapt to the changes which you make in your model's diagrams.

If you Cannot Find Created Elements in the Model Browser

If you have e.g. created an object in a diagram, this is also automatically stored in the model tree. The exact package which the object is stored in is set via so-called create defaults which are managed in the configuration model. There are various options available for finding your object:

A: Select the `Edit>Find>New...` menu item in the model browser and use the dialog box of the same name to e.g. display all elements of the name or type being searched for. The search results can be transferred in the model browser's result region; you can also find the precise path entered there.

B: Select the model element being searched for in the diagram and select `Help>What´s this?`. The package where the model element was stored is entered under `Packages` in the window which appears.

C: Contact your administrator and inquire about the create defaults mentioned.

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Other Information

- chapter B-3, "Searching for Information", page B-81

If You Get Another Context Menu Than Expected

Many users work with context-sensitive menus when calling their menu items. These menus entirely depend on the current selection in the existing illustration.

If a menu which you did not expect opens when you make a right mouse click, this is normally due to the fact that

- A **previous selection** is still active or
- **No selection** exists and e.g. the context menu which belongs to the diagram itself appears.

You simply still need to make the selection which precedes the command which should be implemented.

D-8.4 If You Are Unsatisfied With a Diagram Change

Both contents depth and accuracy, as well as aesthetic criteria–usability in particular–specify diagram usability and acceptance. Even minimal changes in the diagram can lead to loss of quality in progressive modeling. This can be easily corrected.

If You Have Changed the Location of a Graphic Element By Mistake

As model elements are normally linked with each other in many cases, this can lead to location changes for individual elements; this can impair diagram usability.

A quick option for **simplifying** a relationship which has become more like a labyrinth or relationships which are no longer needed is offered by the `Arrange>Standard Layout` menu item upon selection of the relationship. On the other hand, if the command's result does not correspond to your needs, you can immediately cancel this using `Edit>Undo` and use manual changes instead.

Other Information

chapter B-4.3.2, "Positioning Model Elements", page B-107

chapter B-4.3.3, "Changing Model Element Sizes", page B-114

If You Want to Undo Diagram Changes

You can find the `Edit>Undo` menu item in diagrams. This normally refers to the **graphic change** which was **last** made in the diagram (e.g. moving a model element). You can recognize this as the `Diagram>Save` menu item is activated upon such changes being made. As long as you don't carry out this command, you can use the `Edit>Undo` command; after saving, on the other hand, it is no longer activated, as the change was already stored in the model.

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